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The Dyeing of Shoddy Materials

Characteristics of Shoddy—Dyeing as Raw Stock—Control of Results—Stripping—the Hydrosulphite Strip —Suitable Dyestuffs—Dyeing in the Piece—Special Care Required with Cotton Mixtures— Speck Dyeing in the Washer

By LEON W. SIDEBOTTOM

Essex Aniline Works

SHODDY or reclaimed wool is the material obtained from reworking woolen and worsted tailor's clippings, rags and waste material from various branches of the woolen and worsted industry. While naturally inferior to its original form, it is possible for a good grade of shoddy to be superior to a fabric made from virgin wool. However, the fact that cloth made from shoddy is seldom all wool and usually contains a large amount of cotton intentionally added, either in the form of a cotton warp, or carded directly with the shoddy raw stock, makes the finished fabric a much inferior product.

Shoddy is usually dyed as raw stock or in the piece, depending entirely on the pattern of the finished fabric. If for stripes, checks and fancy goods, it must be dyed as raw stock; but if for solid shades, piece dyeing is more economical.

Dyeing Raw Stock

When the material is to be dyed as raw stock, the clippings or rags should be sorted into lots, each lot being made up of rags approximating the same shade as nearly as possible. In some cases this will eliminate the dyeing process entirely, as the rags, after carding and spinning, will have given the desired shade of yarn. This is often the case with blues, browns and blacks.

If the finished fabric is to be all wool, the material must be carbonized to destroy all cotton threads which may come through, as stitching and so forth. This step is not necessary if the fabric is to contain cotton, as subsequent dyeing will cover any cotton coming through with the rags.

The material is now passed through the pickers which break the cloth down to the single fibers as nearly as possible. This is not quite complete, and the stock as it comes to the dyehouse is a tangled mass of fiber, thread and even small bits of cloth.

The dyeing follows the picking. Stripping is to be avoided if possible, as the stock is given a considerably harsher feeling. Without stripping we may obtain on red stock, a deeper red, browns, bordeaux, olive brown, or black. On brown stock it is possible to obtain a darker brown, olives, reddish brown, or black. On blue stock, darker blues, navys, all shades of green, browns and blacks are possible. Green will permit darker greens, olives, browns and blacks. Any darker color may be dyed on gray, but black must be stripped for any color other than black. The brightest shades are obtained by the use of acid colors, but if fulling fastness is desired, the chrome bottom, afterchrome, or, in some cases, direct cotton colors must be used.

Stripping

Should stripping be necessary, one or more of the following methods may be used:

1. Boiling with Glauber's Salt.
2. Boiling with Ammonium Hydroxide.
3. Boiling with Soda Ash.
4. Sodium Bichromate and Sulphuric Acid.
5. Hydrosulphite.

On material which has been dyed with acid colors, boiling with 10 to 20 per cent of Glauber's Salt will often strip the stock appreciably. The boiling should not be continued longer than one-half to three-quarters of an hour, as the dyestuff will tend to attach itself to the fiber again.

Boiling with 1 to 2 per cent Ammonium Hydroxide is more effective than the Glauber's Salt boil and will strip most of the acid colors very readily.

Boiling with 1 to 2 per cent of Soda Ash for one-half hour is recommended if the material is to be dyed a shade fast to fulling. The Soda Ash will strip any colors which might bleed in the later operations.

To strip with Sodium Bichromate and Sulphuric Acid,

the bath is made up with 4 to 7 per cent Chrome and 5 to 10 per cent Sulphuric, with or without the addition of 4 to 7 per cent of Oxalic Acid. The material is run for one hour at the boil. This method leaves a yellow bottom of Oxide of Chromium on the fiber, which acts as a mordant for any Chrome colors which may be used in redyeing.

The Hydrosulphite Strip

The hydrosulphite strip is perhaps the most desirable, as it leaves an exceptionally clean fiber with very little harsh feeling. The material is worked at 100 to 120 deg. Fahr. in a bath made up of 2 to 4 per cent of a formaldehyde hydrosulphite and 1 to 2 per cent formic acid.

Raise to a boil in one-half hour and boil one-half hour. Wash well. In place of the hydrosulphite mentioned above we may use a hydrosulphite made up from Zinc Dust and Bisulphate of Soda. This will not keep long without decomposition and should not be made up in greater quantities than is necessary for immediate use. Convenient proportions of these chemicals are as follows: 14 gals. of 52 deg. Tw. Bisulphite of Soda are diluted to 50 gals. with water. 15 lbs. of Zinc Dust are then shaken in gradually with continual stirring, the temperature being kept as low as possible to prevent decomposition. The mixture should then be stirred for an hour and allowed to settle. The clear liquid is then ready for use, enough being taken to obtain the desired stripping action. The Formic Acid should be omitted when using this Hydrosulphite. Thorough washing must follow any of these methods of stripping.

Suitable Dyestuffs

For the dyeing, in the raw state, we may use the direct cotton colors, acid colors, chrome bottom or afterchrome colors, and occasionally a few basic colors. The dyeing is usually conducted in open kettles, the material being agitated by poling. The direct cotton colors, although not extremely bright, yield dyeings of good light and fulling fastness. They are dyed with the addition of Glauber's salt and exhausted with Acetic Acid. The acid colors yield bright shades but are not usually fast enough to fulling for general use. They are dyed with Glauber's salt and exhausted with either Acetic or Sulphuric Acid. The true insoluble alizarine colors, or chrome bottom colors, are seldom used (unless the stock has been stripped with chrome and sulphuric acid) as they require two baths and lengthen the process considerably.

The afterchrome colors find the most favor, as they do away with the necessity of two baths. They are dyed in an acetic acid bath with or without the addition of Glauber's salt and exhausted with sulphuric acid. The chroming takes place in the same bath and any further addition of dyestuff for shading may be added after the dye bath has been cooled to about 160 deg. Fahr. No further chroming is necessary. Basic colors, with the exception of Victoria Blue, find little use in shoddy dyeing. Where extreme brightness is required, with little or no fastness, they find occasional use for the topping of dull shades. They should be applied in a strong acetic acid bath with no other addition. The nature of the stock causes the dyed material to look very uneven, but the subsequent carding and spinning will equalize any unevenness caused either by faulty dyeing or different colors in the stock.

Piece Dyeing of Shoddy

By far the greater amount of shoddy dyeing is conducted in the piece. It may be necessary to strip, in which case the same methods are followed as mentioned in connection with raw stock. Bright brilliant shades are seldom available, due to the nature of the material, and usually run to tans, browns, dark reds, navy blues, dark greens and blacks. If the cloth is all wool, these are easily obtainable with the use of chrome top or chrome bottom colors. When the shoddy filling has been woven into a white cotton warp, however, we must resort to the direct cotton colors. The warp must be dyed slightly heavier and duller than the shoddy filling, otherwise the warp will appear thin and "hungry." This is accomplished by mixtures of neutral dyeing acid colors and direct cotton colors. The method of dyeing the piece will vary considerably with the nature of the fabric. Heavy goods, with the filling napped up heavily to cover the cotton warp, will require a considerable amount of Glauber's salt and slow treatment. The necessary amount of color, previously dissolved, and 20 to 30 per cent Glauber's salt, is added to the cold dye bath, and the goods allowed to run until thoroughly penetrated. The addition of a little soluble oil at this time will also aid the penetration. If the material is very heavy, running with 20 per cent of Glauber's salt, before the addition of the dyestuff, is recommended. The temperature of the bath is then gradually raised to a boil and boiled until the wool comes to shade. If, after boiling, the cotton is found to be weak, more of the direct cotton color is added and the goods run in the cooling bath. On lighter fabrics, with the cotton warp showing plainly, both warp and filling must be brought more closely to the same shade, although it is still good practice to have the cotton slightly heavier and duller. They do not need the long preliminary treatment, as the cotton will cover readily. The usual procedure is to start the dyeing at room temperature, raise to a boil in one-half hour and boil the wool to shade.

Presence of Cotton Requires Special Handling

When a considerable amount of cotton has been carded and spun with the wool into filling, especial care must be taken not to have the results specky. It is advisable to choose a mixture of dyestuffs so that the desired shade is obtained with the least possible amount of boiling. To illustrate with a dark green; the formula might read as follows:

For 100 lbs. of material, dye with

1 lb. 8 oz. Diazine Black.
7½ oz. Stilbene Yellow.
1 lb. 4 oz. Naphthol Blue Black.
30 lb. Glauber's salt.

Raise to a boil in one-half hour and boil twenty minutes. The Diazine Black and Stilbene Yellow will dye the cotton a dull green and as neither dye the wool, the cotton is readily brought to shade in the slowly heating dye bath. At the boil the Blue Black and Azo Yellow will bring the wool to the proper shade without detracting from the strength of the cotton. If, instead, a direct green and direct black had been used, continued boiling, necessary to bring the wool to shade, would have caused the cotton to look thin and specky.

A still better practice in connection with union shoddy work, although more expensive, is to dye the cotton warps first with sulphur colors, somewhat heavier and duller than the shade to be matched in the piece. Then, after weaving this dyed warp with the shoddy filling, we may use the faster afterchrome colors to dye the wool.

Speck Dyeing in the Washer

Still another possibility is speck dyeing in the washer. If the rags have been sorted, garnetted and spun into the desired color, dyeing of the stock is unnecessary. The goods from the loom are napped, fulled, washed and are then ready for specking. Direct cotton colors are selected which will approximate the same color as the wool. If a green is desired, use Diazine Black and Stilbene Yellow; for a brown, a mixture of Stilbene Orange and Diazine Black; for a blue, use Diazine Black alone. Benzo Purpurine may be used for red, but care must be taken to use as low a temperature as possible or the wool will become stained. For black, a typical example would be as follows: The washer load is made up of sixteen pieces of forty-five yards each, weighing eight ounces to the yard. Material is 60 per cent white cotton. Eight pounds of direct black and one pound of Soda Ash are dissolved in fifty gallons of water and run into the washer at 120 deg. Fahr. Twenty-five pounds of Common Salt are then added and material run one-half an hour and rinsed The cotton will be well covered and will possess much better light fastness than the much used logwood black speck dye.

In conclusion, it must be remembered, that reworked wool has greater affinity for dyestuffs than virgin wool, due to the fact that the material may have been carbonized, or that chrome, or similar metallic salts, may have been used for the production of the original shade. Also, it is well to bear in mind, in connection with union shoddy dyeing, that all direct cotton colors stain wool but slightly at low temperatures, or with the addition of a slight amount of Soda, but at boiling temperatures even the Stilbene Yellows and Oranges will stain to a slight degree.

The Piece Dyeing of Ladies' Dress Goods and and Coatings with Acid Colors

Part II

General Consideration of the Dyeing Process—Various Methods—Dyeing of Light-Weight Fabrics—Dyeing of Ladies' Coatings—Cotton Warp-Worsted Filling Effects—Shading—Stripping—Repairs and Redyes

By B. T. C.

(Concluded from page 220.)

General Consideration of the Dyeing Process

ACID colors dissolve quite readily in boiling water. There are three general ways in which dyestuffs may be dissolved, each of which has its advantages and disadvantages.

One method is to boil up the color in pails and, after sieving to keep back all foreign matter and undissolved dyestuff, to add direct to the kettle. Cold water is admitted until the steam pipes are covered, the steam turned on and everything boiled for ten to fifteen minutes. As a rule the kettle is then cooled down by adding water and the pieces thrown in. In rare instances this boiling up takes place during the afternoon before the dyeing is to take place, and the liquid allowed to cool overnight. Such practice is rather dangerous, due to leakage, and certainly is not to be recommended.

A second method is placing all dyestuff in a finely meshed cotton bag and tying the ends with a suitable length of rope. The kettlemen simply swish the bags of color back and forth in the dye kettle, using a lukewarm bath, until all the color is dissolved.

Generally, however, the color is boiled up with a sufficient quantity of water, and then the solution is strained through a finely meshed copper sieve. Naturally more water is needed for full shades than for light shades, due to the wide difference in the amounts of dyestuff.

Before adding any color or chemicals it is well to look over the kettle rather closely. It should be seen that the plugs are absolutely free from lint, threads or woolen waste, or else there is always the chance of part of the dye bath leaking out. When leakage occurs it means not only a loss of dollars and cents to the mill but more trou-

ble for the dyer in bringing the bath up to shade. Enough water should be added, because too short a bath means cloudy results in the dyed pieces. There is hardly any need to mention here the danger of overcrowding the kettles. When the foreman is absolutely certain that everything in the kettle is as it should be, he should order the men to add the requisite amount of Glauber's salt. At this point it is often advisable to heat the bath to 110 deg. Fahr., or until the salt is dissolved. The color may now be added. Care should be taken that the solution is not too concentrated and that none of the color is spilled on the pieces. This is especially important if the carbonized goods have not previously been neutralized with ammonia. When all the color has been added, the vitriol, or whatever acid is being used, may be poured into the bath. Under no circumstances allow any of this acid, which is more or less concentrated, to spatter on the goods. Such carelessness is the cause of shaded and cloudy pieces.

After all dyestuff and chemicals have been added, allow the pieces to run ten minutes before turning on the steam. This allows the liquor to penetrate well into the fabric. Then turn on the steam and raise the temperature gradually to the boil in one hour for light and medium shades and in one hour and a quarter for such full shades as navy, dark brown, dark green, etc. Care should be taken that the steam issues uniformly from each outlet, as uneven steam distribution is apt to cause trouble. It is also well to keep the apertures of the steam pipes free from tufts of loose wool. All dyers are more or less familiar with such instances as having six pieces of an eight-piece batch dyed perfectly and the other two pieces rejected. Uneven distribution of steam has much to do with such results.

After the kettle has come to the boiling point, allow it to boil strongly for half an hour. At the end of that time turn off the steam and sample, being sure that the operator doesn't turn on the steam until a color addition has been made or until given orders to do so. The small samples are generally dried between a folded cotton cloth wrapped around a steam pipe, and after being cooled are brought to the dyer. This last point is very important, as the shade often changes appreciably as the samples are cooled. For instance, a red always tends to go bluer on cooling. When it is necessary to make an addition to bring the batch up to standard, filter the color, as at the start of the operation, and add the liquor carefully, being certain, first, that none of the color strikes the hot pieces, and, second, that the solution is distributed evenly throughout the kettle. When all has been added allow the kettle to run five minutes without steam—ten is better—and then raise to the boil and boil for one-half hour before sampling again. For light shades, twenty minutes' boiling after making an addition is sufficient. When the batch is up to shade, continue the boiling. Blacks, as a rule, are boiled one hour, sampled, and if up to standard are boiled another quarter of an hour, after which they are washed. Navy shades are boiled one hour and a half to two hours, depending upon the quality of the goods. With other shades, however, it is advisable, after boiling the required length of time, to turn off the steam and allow the pieces to run through the cooling bath for another half-hour. By taking this precaution the bath is cooled perceptibly and there is less danger of streaky goods due to faulty rinsing. However, it should be remembered that the shades go darker on cooling and that this fact must be allowed for by the dyer.

Washing off after dyeing is quite as important for securing good results as is the use of proper dyestuffs and acid. If the kettles are equipped with warm-water pipes, wash with this until the bath is lukewarm. Then turn on the cold water and continue rinsing until the bath is clear. If cold water alone is used for this operation, care should be taken that the water does not strike the pieces directly and that it is equally distributed throughout the kettle. Some mills have lengths of hose which may be stretched from kettle to kettle as needed. In any case, never remove pieces until they are absolutely cold. This naturally means that on the average the rinsing will take a longer time in summer than in winter.

After the goods are removed from the kettles they are either extracted while in the rope form or, better still, opened full width and then sent to the centrifugal. After this the goods are sent the finishing department.

The Dyeing of Light-Weight Fabrics

Under this heading come such fabrics as serges, tricotines, gabardines, Venetians, Poiret twills, poplins, stockinettes, crepes, etc. Tacking is the first consideration. If the particular style in question tends to form mill wrinkles during the dyeing operation, it is well to tack before sending the pieces to the kettles. By tacking we accomplish a change of fold; that is, the pieces do not tend to run over the winch in the same creases or folds, but, due to the air pocket formed, vary continuously.

The time required for bringing to a boil, etc., has been described at length in a preceding paragraph.

Worsted crepes are treated somewhat differently. Due to the fact that they are often made from very tightly twisted yarns which are used both in the warp and filling, the dyer has to watch this type very carefully. This is especially true if the fabric has been carbonized in the piece, since complete neutralization with ammonia is rendered difficult because of the tight twist. As a rule, the temperature of the neutralizing bath is raised to 130 deg. Fahr. or even 140 deg. Fahr. Some dyers go so far as to raise to a boil, but the wisdom of such a policy is doubtful. Dye according to the method given, although the use of acetic acid and subsequent exhaustion with sodium bisulphate is to be recommended in place of sulphuric acid. At times it is even necessary to add but half the color and all the acetic acid at the start of the operation, raise the temperature to 150 deg. Fahr. in half an hour, and, after turning off the steam, to add the second portion of color. Allow the pieces to run ten minutes with-

(*Continued on page 278.*)

The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture

Part III.

(*Continued from page* 188.)

By A. K. JOHNSON, S.B.
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Using the Microscope—Factors Affecting Results—Cleanliness—Thickness of Coverglass and Tube Lengths—Influence of Mounting Medium—Preliminary Treatment of Object and Care in Preparation of Mount—Illumination—Care of the Eyes—Posture

Using the Microscope

OPERATING the "delicate" microscope appears to be a tedious and confusing task to the uninitiated. Such, however, is not the case in a large majority of uses. The operations for use in average work are easily done, the danger to the instrument is very slight when a few common-sense precautions are observed, and the feeling of confusion experienced in the preliminary work is relieved very shortly by a systematic method of procedure. A reasonable time spent in studying and in practising the principles of operation, and in observing the more common factors affecting the results, will give an understanding of the instrument and its use which will instill confidence and arouse an interest for further work.

Using the microscope as an instrument is dependent upon four operations, namely, (1) placing the object in proper position, (2) illuminating the object so that the light will come from it into the microscope, (3) focussing the miscroscope so that it will be at the correct distance from the object to give a sharp image, (4) controlling the magnification for the particular problem at hand, or manipulating other devices for special study.

In the case of simple microscopes these operations are very easily carried out. The position of the object is of little account so long as it is reasonably flat and is in good light; it may be located on a table top, on a glass plate or held in the hand or by a stand, depending upon its nature.

The quantity of light required is not large and the supplying of it not at all difficult. Simple microscopes are usually of a single, low magnifying power so that little choice is offered or needed for the kinds of work to which they are adapted. In case of focussing there is usually some demand put upon the operator to adjust the distances of the microscope from the object. This is accomplished by holding the instrument near to the eye and moving it toward or away from the object until a clear image is seen. Manipulating the simple microscope is so very easy as to seem almost like second nature.

With compound microscopes the problem of fulfilling the conditions necessary to give good microscopic vision are more exacting. This is increasingly true as the power of magnification becomes greater and greater. There is more and more need for a thinner, flatter object more carefully treated in preparing it for examination. The free distance between objective and object becomes more minute, and the distances of movement of the instrument finer. The area visible becomes less (see Table 2) and the details shown more and more unlike that of every day visual use. In addition to these is the need for using the lighting accessories. All of these conditions give the novice a sense of strain in using the instrument and make it a little difficult at first for him "to see anything." By beginning with the lowest magnifications where conditions are easiest, encouraging familiarity with the instrument is readily acquired. Use of higher powers is then more easily made. To use the compound microscope, the properly prepared object is placed upon the center of the stage over the opening and under the objective. The lighting devices (mirrors, condensers) are arranged to throw light upon the object, and, with the eye held at the level of the stage, the microscope is lowered by the course adjustment until the objective almost touches the cover glass. The eye is then changed to a position over and near to the ocular, and

TABLE 2

Showing magnifying powers of objectives and oculars alone and when combined. Also gives, in mm., the diameter of field when instrument is in focus (from Bausch & Lomb Company catalogue.)

Table of Magnifications and Real Fields
Tube length = 160 mm. Projection distance = 250 mm.

Objectives		Eyepieces				
F. L. in millimeters	Initial Magnification	5×	6.4×	7.5×	10×	12.5×
48	2	10× 19.5 mm	13× 9.0 mm	15× 8.5 mm	20× 8.5 mm	25× 6.8 mm
32	4	20× 5.5 mm	26× 4.8 mm	30× 4.3 mm	40× 4.4 mm	50× 3.5 mm
16	10	50× 2.10 mm	64× 1.85 mm	75× 1.70 mm	100× 1.74 mm	125× 1.38 mm
8	20	100× 1.02 mm	130× 0.90 mm	150× 0.83 mm	200× 0.85 mm	260× 0.67 mm
4	43	215× 0.48 mm	275× 0.43 mm	320× 0.39 mm	430× 0.40 mm	560× 0.32 mm
3	57	285× 0.36 mm	365× 0.32 mm	420× 0.29 mm	570× 0.30 mm	740× 0.24 mm
1.9	95	475× 0.22 mm	610× 0.19 mm	720× 0.17 mm	950× 0.18 mm	1260× 0.14 mm

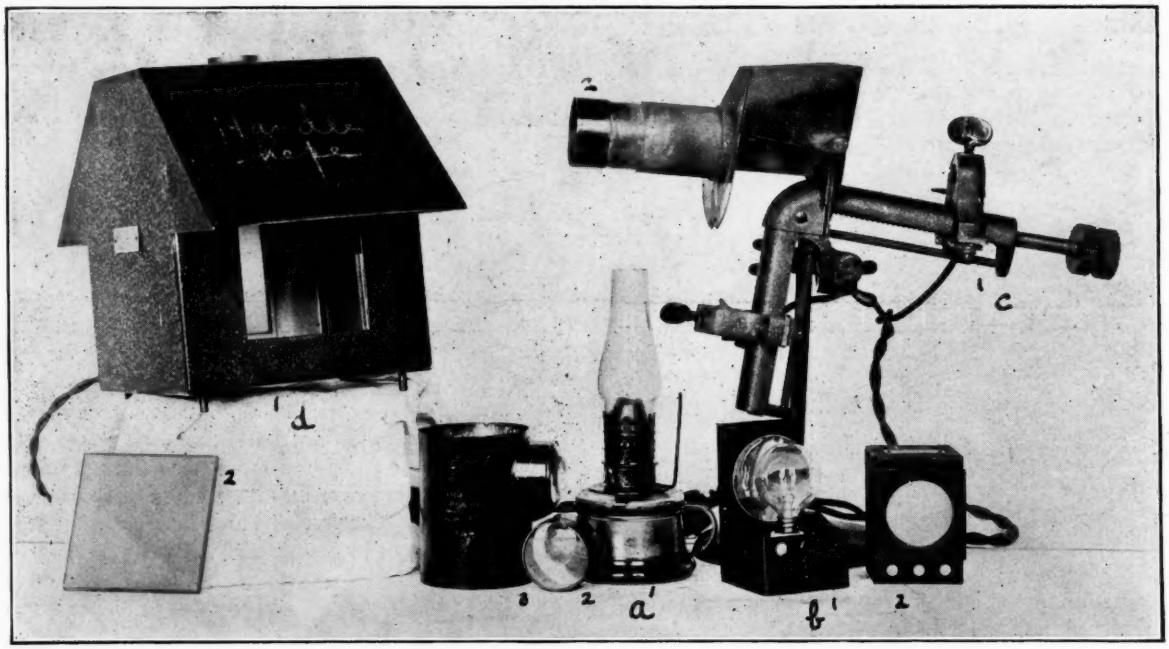


FIG. XI—*Some Artificial Sources of Light for Illumination*

a—(1) A small oil, wick lamp with support for (3) a hood provided with a bull's-eye lens. The blue glass (2) fits over this lens and helps to correct for excess yellow in the flame.

b—(1) An individual electric lamp with reflector and with base over which fits (2) a hood provided with a disk of ground glass for diffusion of the filament light and with a disk of blue glass for color correction. This light may be so placed as to shine into the mirror of the microscope, or this mirror may be pushed aside and the lamp placed between the legs of the base so that its light shines directly upward to the stage opening.

c—(1) A hand, carbon arc lamp on a stand. This lamp is of good service for lighting with a vertical illuminator or for giving reflected light from the object. The light rays are focussed by a lens in (2). A blue glass is also inserted into (2). It is well to remember that the heat rays are also focussed by this lens, and therefore the arc lamp should be used only when this condition is *not* harmful.

d—(1) is an electric lamp house provided with two diffusion blue glasses. One of these glasses (2) is removed. Through the opening in the house into which (2) fits is seen the other blue glass. This lamp house will illuminate four microscopes of once.

the microscope raised until a clear image is given. This procedure prevents the danger of violent contact of the objective with the cover glass with probable damage to either or both. It is one of the common-sense precautions. Final adjustments of the position of the object, the illumination, and the focus may then be made and the study begun.

SOME FACTORS AFFECTING RESULTS

(a) *Cleanliness*

Cleanliness of all optical parts, glass surfaces, instruments and reagents, is a very important condition to meet in getting clear and satisfactory images. Smears and films upon the surfaces of the objectives and oculars is highly detrimental, making it impossible to obtain distinct images. These smears usually come from contact with the fingers or from immersion in fluid used upon the object. Dust easily penetrates between the lenses of the ocular and upon the back lens of the objective. Such particles appear in the image and are very liable to be confused with the object being studied. It is a good practice to examine all optical surfaces and remove all smears and dust with a soft, lint and grit free cloth or time paper before starting to use the instrument. Very small objects are usually placed upon glass strips, or slides, for examination, immersed in a suitable liquid or solid medium, and covered with a thin glass (0.18 mm. thick, a so-called cover glass). These glass slides and cover glasses give best results when perfectly clean. The mounting medium should have as little suspended sediment as possible. Strict attention to the cleanliness of these things gives much comfort and satisfaction in obtaining sharp images, in eliminating undesired and confusing foreign images, and in reducing false interpretations of what is seen.

(*Continued on page* 280.)

Technical and Practical Faults in Wool Dyeing

Being the Report of a Discussion Conducted at the D ecember 9 Meeting of the Huddersfield Section, Society of Dyers and Colourists, and Continued at the January 13 Meeting. Published in the Journal of the Society

(See note, page 273, under heading, "Proceedings of the A. A. T. C. C.")

DECEMBER MEETING

EDMUND STAPLETON, who opened the discussion, said that one of the greatest problems facing the dyer to-day was the question of listed pieces. Twenty to thirty years ago this was unknown, simply because it was not looked for. If the required shades were produced, that was all that was necessary. The comparison of the list and the middle of the piece was not done then, even by the best perchers. A blotched or clouded piece did not come under the heading of a listed piece. This fault was caused as a rule by soap being left in the piece, but sometimes the dyer was apt to be rather hard on the scourer, though the scourer was partly to blame in many cases. Certain oils and various compounds of size were used in worsted cloth, which were difficult to dislodge in the scouring, especially in the harder cloths.

In some cases listing might be a mechanical defect. Goods such as Venetians and satin-faced cloths sometimes showed slackness at the sides and the ends, causing a big difference from the middle in the matter of shade. In dark shades this might not be so pronounced as it was in a fawn or light brown, where it was very marked. Again, in pieces of one quality, they would invariably find the milled goods darker in shade than the plain goods.

There were also pieces which rolled up at one or both sides through neglect in the weaving shed. Some years ago he had a large number of pieces of this description. They asked the customer concerned to come and see the goods, and he at once took up the matter and remedied the fault. Since that time they had never had to bag or sew a piece from that firm.

There were ways in which listed and flecked pieces could be caused in the dyehouse—namely, (1) by entering goods into the liquor too hot; (2) by getting up to the boiling point too soon; (3) by not boiling thoroughly either in chroming or dyeing, thereby taking a risk of the washing producing an uneven color. Each man had his own methods of working and consequently it would be a help to them all if they could compare notes with regard to these faults.

In reply to J. F. Copley, Mr. Stapleton defined a listed piece as one in which the shade at the selvedge was different from that in the middle of the piece, either lighter or darker.

Arthur Mallinson said that from some firms they got pieces which curled or bagged, and from other firms the pieces gave no trouble. What was the cause of this defect? The cloths in question were Venetians.

Mr. Stapleton said it was caused by bad weaving, or by a tight warp.

The Chairman (Dr. Paul) asked if there was anything in connection with washing out the size which might cause trouble.

Mr. Stapleton said the trouble was that they did not know what had been done with the piece. They always assumed that the size had been removed, but it seemed to be a frequent cause of trouble. When milling was done, the defect was sometimes a mechanical one, through some portions of the piece being more milled than others.

H. E. Wood asked what class of goods was usually subject to listed faults, and Mr. Stapleton said it was generally the harder twists. There was seldom any trouble with soft goods, but at the present time the tendency was to make harder twists.

J. Morton said they had found a great deal of difficulty with hard twists, and he considered that it was often caused in the preparing of the pieces. They had consequently gone thoroughly into the preparing processes, the crabbing, blowing, milling, and scouring, and had made a very great diminution in listedness. The only way to eliminate it was to exercise very great care and supervision over the preparing processes. With regard to bagging, he had had four pieces recently of a very low serge, to be dyed light fawn. The first run had been unsatisfactory, and he had done them again, but still they were listed—red at one edge and green at the other. The third time he had bagged the pieces, and they came up perfectly level.

Mr. Stapleton said he quite agreed with Mr. Morton with regard to the preparing and scouring processes. With regard to crabbing, they had had a case in which the wrapper had been used until it was colored, and the color had gone on to the piece at the list, where the steam came out.

Mr. Morton said that some years ago, in doing some very wide goods—60 inches wide—they had traced the trouble to the fact that after crabbing, the goods were left to stand overnight on a horse, and the pressure in the middle of the piece squeezed the liquid out to the edges. The goods were steamed the following day, which consequently set the fault.

Dr. Paul said that he thought the benefits of using

ammonia were very much exaggerated. If it was a question of soap being left in the piece, he did not see how ammonia would help.

Mr. Stapleton said that some men preferred to leave a little soap in to improve the feel; but he preferred to have it all out.

A. Gaunt said that pieces boiled up with ammonia would lather more freely.

Dr. Paul said that even weak ammonia would dissolve wool completely, consequently he would not care to boil wool in water containing ammonia.

Mr. Copley said that some years ago, when there was a drought, some local manufacturers had used for scouring purposes the water obtained by his firm from bore wells. The water was slightly alkaline, and they had found that when they rinsed off the soap there was no lime soap formed, while when the goods were in the stocks the lather would form again without any soap being added. That experience certainly seemed to show that with water on the alkaline side the soap would be more soluble and more easily rinsed out.

R. F. Whalley said that a dyer did not often get a manufacturer to admit his fault, but when the manufacturer was his own dyer that would be done, and a friend of his who was in that position considered the chief cause of listed pieces to be faults in manufacture. If the warps were not beamed and woven properly the piece was slacker on the list than in the middle, and the dye was taken up more on the list than in the middle. His friend was so keen on the point that he would not have any warps made for him, and said he had removed all liability of listed pieces

J. Hollingworth said that in a listed piece the fault was usually regular from one end of the piece to the other, which seemed to prove that it was not caused by the dyeing machine, where the cloth was running in rope form. There were probably half a dozen different causes, some due to manufacture and some to scouring and finishing. One of the chief was the crabbing and blowing process. If the pieces were not crabbed and blown thoroughly, they would certainly be faulty, either listed or cloudy. A curled piece could always be dyed satisfactorily by having it bagged, and the only way to correct a listed piece was to strip it and dye it bagged. He was a believer in ammonia. Most of the fast chrome dyes now used were started in an alkaline bath, which did not become acid until near the boiling point, and the goods apparently did not suffer to any extent. But ammonia attacked the copper parts of the machine, and the most common trouble when using fast chrome dyes was the production of metallic stains. The only way to prevent their formation was to use machines in which copper and iron are absent. Careful supervision in crabbing and scouring and milling, a correct speed for the dyeing machine, and, where there was a tendency to list, the use of bagging, were the precautions which he thought would overcome the difficulty they were discussing.

R. Horne said he did not think bagging was an absolute cure. With regard to stripping, in the case of indigo and most blues, he found listed pieces would strip better in the hydrosulphite bath after treating with ammonia.

Mr. Stapleton said that bagging might remedy the defect if it was caused by dyeing, but if it was due to size or a defect in manufacture, it would not be a remedy.

Mr. Hollingworth said that in the case of Coomassie Navy Blue the best way of stripping was a strong solution of Glauber's salt and ammonia.

In reply to a question by Dr. H. H. Hodgson, Mr. Stapleton explained that "bagging" meant the sewing together of the two lists or selvedges, so that the piece formed a tube or bag. The stitches were kept about 6 inches apart to allow the dye to penetrate. Of course, bagging did not cure all kinds of listing. It was used when pieces were found to curl when wet.

In reply to Mr. Copley, Mr. Stapleton said the list was usually darker than the center of the cloth. Occasionally only one list was affected.

Mr. Copley said he had been told that in worsted spinning there might be too much tension in the spinning, or the yarn might be wrapped too tightly on the cop, and it would then show weft marks. There would be no apparent difference in the loom, but the thread would be under tension, which would affect the taking-up of color. In cotton dyeing, when they dealt with solid cloths like gabardines, where very exact shades were required, great importance was attached to the tension of the warp when dyeing. He thought the same thing would apply with woolens. Again, in dyeing a piece in rope form, the edges would be freer and more easily acted upon by the liquor; while the center of the piece would take most of the pull. If the piece were bagged, it would remove the looseness of the edges.

Mr. Wood said he thought listing was caused chiefly by defects in two processes—weaving and crabbing; and he believed the latter was the more important of the two from the dyer's standpoint, because with bagging the tension of the warp would not be dangerous. If any soap or fatty matter were left in the piece it would tend to travel to the list. The fatty matter might cause a dark or a light list.

Mr. Stapleton said it would usually cause a light list. The dark list was the principal trouble.

Mr. Wood asked if the dark list could be caused by there being too much water in the steam, because wool boiled in water would come up a little darker than wool which had not been so treated. Naturally, the lists of the pieces would be more exposed in the crabbing machine and more water and condensed steam would be present Another list defect could be caused by the edges absorbing moisture after drying more quickly than center of the piece, which changed the color of some dyes.

Mr. Stapleton said that though they might crab the coarse goods and lighter weights, they did not often crab a good botany of 18 oz. weight, and yet pieces were listed where there had been no crabbing done.

Listing could be caused by crabbing, he agreed, and also by the steam.

Mr. Hollingworth said there was no doubt a listed piece could be caused in half a dozen different ways. He thought the size which was used nowadays caused much trouble. Some of the sizes used were acid, and if they were absorbed unevenly trouble would result.

The Chairman said he did not think any size would be sufficiently acid to cause trouble of that sort. If the size dried on the cloth it would form a hard film and be difficult to wash off.

Mr. Mallinson said that would hardly explain a list which was darker than the middle. It was usually said that when the list was lighter it was not the fault of the dyer, but when it was darker the dyer was blamed.

Mr. Hollingworth said he did not agree with that, because the fault might be regular from one end of the piece to the other.

Mr. Horne said the general appearance of the piece might be that it was evenly dyed until the list was brought close to the middle for comparison.

Mr. Morton said he thought that size caused a lot of listedness, altogether apart from weaving.

Mr. Mallinson said that size would tend to make the list lighter, and Mr. Hollingworth replied that he thought crabbing would send the size to the edges.

Mr. Stapleton said that hundreds of pieces in Huddersfield and Bradford were listed which had not been through a crabbing machine, and what would be passed as satisfactory for a crossbred or for the Dewsbury trade would not pass for a Botany.

Mr. Whalley said he was assured by a Bradford manufacturer that very few warps were sized nowadays. Mr. Stapleton, however, said he thought the majority of the lighter weights were sized. It was very seldom that soft goods were listed.

The Chairman raised the question of the effect of oil, and Mr. Hollingworth said that on certain pieces they got what were called drought marks, which he attributed to the oil having oxidized so that it could not be scoured out.

The question of "flecked" pieces was then raised, and Mr. Stapleton said he did not think that the fault was at all common nowadays. He had not seen a flecked piece for months. Flecking might be due to soaping, but was generally a dyeing fault. It was caused probably by entering the liquor too quickly or too hot.

In reply to a question, Mr. Stapleton said some dyers ran the pieces dry into the liquor if they had previously been scoured, but they allowed them to get thoroughly saturated before any steam was put in, otherwise fleckiness would be caused.

Mr. Horne said that in scouring a good deal of marking was caused by running the material through in a semi-dry state in the washer. There would be less marking if the pieces were thoroughly wetted out before scouring and also less need for crabbing, which tended to cause listing.

Mr. Whalley asked if it would lessen the risk of listing if the pieces were kept opened out until they got to the boil.

Mr. Stapleton said in that case they would only be able to do three pieces instead of five, and output would be lost.

January Meeting

James Hollingworth, in reopening the discussion, said that faults in woolen and worsted piece goods was such a big subject that at the December meeting the whole of the evening was devoted practically to one fault, listed pieces. It was not possible, except in a few isolated instances, for a dyer to create that fault. The difference in shade between the body of the piece and the lists was usually the same from one end of the piece to the other, and to have a piece running in irregular rope form over the winch of the dyeing machine, with sometimes the list exposed for a few yards and sometimes the list wrapped inside the body of the piece, was to have a condition of things which could not result in a regular dark or light list throughout the piece.

In the case of Indigo dyed in the vat, the fault might be caused in the dyehouse. If the hawking machine was not well under the liquor, or if one end of the machine was nearer the surface than the other end, or if the workman in keeping the piece running straight pulled up the list so that it became exposed to the air, then such conditions might cause a listed fault, because the list would be running in a more oxidized portion of the liquor than the body of the piece, and would therefore be darker. Also in the case of such cloths as union gabardines, which were wool-dyed first and afterwards cotton-dyed on a padding machine, a listed piece might result from the uneven nip of the squeezing rollers. Except for such isolated cases, the cause of a listed piece must be looked for outside the dyehouse. For instance, the use by a manufacturer of an oil containing an excess of unsaponifiable matter or of an inferior insoluble size would most certainly cause trouble to the scourer, finisher, and dyer. If pieces containing such impurities were put through the crabbing process there was a liability to cause a listed piece, because in that process the greatest pressure in the crabbing rollers was in the middle of the piece, and this would squeeze the impurities towards the lists, and thus affect the subsequent dyeing.

Coming next to flecked pieces, this was a trade term for an unevenly dyed cloth which had a cloudy or patchy appearance. The majority of flecked pieces were the result of imperfectly prepared pieces as received by the dyer. In the case of woolens and woolen weft goods, a cheap blending oil used in the teasing room could cause great damage. Careful supervision in scouring and milling was essential to avoid flecked pieces. Not only must the scourer give every attention to each batch of goods, but a careful selection of materials would help him in turning out satisfactory work. The scourer needed a soft water, a pure alkali,

a good soft or hard soap, and ammonia. If the water was above 5 to 6 degrees of hardness the scourer was greatly handicapped both in turning out efficient work and in cost of materials. The best alkali was the cheapest and most efficient. Soft soap was the better soap, but, if too expensive, a soda soap made from a low melting point oil was preferable to one made from a fat like tallow, which had a comparatively high melting point. The former soaps were more soluble, and therefore easier to get away from the goods. If, owing to faulty scouring or the use of a too-hard water, the goods were delivered to the dyer containing too much soap, the result was very often a flecked piece.

Carbonizing was a process which, like scouring and milling, easily lent itself to faulty work. The wool fiber had a great affinity for mineral acids, and these in turn absorbed most wool colors so rapidly that unevenly dyed pieces frequently resulted. He suggested that in milled goods the carbonizing process should take place after scouring and before milling. This would necessitate a thorough neutralizing before milling, and was therefore more expensive than carbonizing immediately before dyeing. For these goods the dyer was wise to select the most soluble and level-dyeing colors at his command. One of the largest manufacturers and Government contractors whose works were self-contained, starting with the greasy wool and producing the finished piece, had experienced so much trouble with carbonized goods that he had put the carbonizing process after dyeing, and was doing this very successfully. This method was satisfactory for dyers who were in a position to carbonize their own goods, but to send dyed goods out to a commission house where all kinds of goods passed through one carbonizing bath might be dangerous.

With regard to the question of the dyer's responsibility, given a good clean piece, there was no reason why the dyer should not produce a level-dyed result, if ordinary precautions were taken. Most dyestuffs required starting at a low temperature and gradually raising to boiling point. A few, such as Alizarine Brown or Khaki Brown, dyed by the one-bath method with chrome, required a higher temperature at the start, because if the temperature of the bath became too low the tendency was for the color to fall out of solution, and it was then impossible to dye evenly. Some dyestuffs had the peculiar physical property of forming a tarry body which was dissolved only with great difficulty. If the bath were first made alkaline with ammonia these dyestuffs would dissolve easily, and dye without fear of color spots or stains. A precaution against flecked pieces when applying mordant colors by the afterchrome process was to cool down the dye bath before the addition of the chrome. Very often a flecked piece might be the result of careless "salting" when making additions to the dye bath during the dyeing process to get to shade. On the other hand he had known cases, in dyeing light shades such as biscuits, fawns, light gray, etc., with a combination of fast-to-light acid colors, when a salting or addition of some level-dyeing color tended to improve an otherwise "skittery" or imperfectly dyed result. In loose wool dyeing in the open pan he had found it impossible in some cases to obtain a level result without salting. In such cases the bath was charged with less color than would be required, and the remainder salted in, say, after half an hour's boil.

Another point which was often overlooked was the speed of the winch dyeing machine. In using some dyestuffs the speed did not matter very much, as they were so level-dyeing that the goods would be perfectly dyed if the winch was simply creeping round; but in the case of the more insoluble mordant colors, it was necessary to pass the goods through the dye bath at a speed sufficiently rapid to obtain a level result.

With regard to stained pieces, most dyers have had pieces returned to them bearing tickets marked "dyers' stains." These could be classified as oil stains, loom stains, draught or weather stains, metallic stains, and mildew stains. In this connection what dingy, cold, ill-lighted and unprotected places most of the older dyehouses were! Even in the middle of the day it was like working in a tunnel, and it was really surprising that stains and such faults were not more frequent under such conditions. The more modern and ideal dyehouse eliminated drop stains so far as the dyer was concerned It was electrically driven, a small direct-drive motor to each machine; there was no shafting and countershafting with its cogwheels and miles of belting throwing off grease and a constant stream of rusty water. Each machine would be hooded, and the steam conducted to a central heated channel (to prevent condensation), and drawn out into the open air by a sufficiently powerful fan.

He was unable to say how the draught or weather stain got its name It usually occurred as a light-colored patch which had resisted the dye, on the edges of the goods and across from list to list and up the center of the piece if it had been folded or rigged and in stock for some time. It was the result of the oxidation of the oil in the goods. Given proper conditions, this oxidation could become far enough advanced in one or two hours' time to cause this fault. Absolutely clean material, free from oil or soap, could be kept in stock without much fear of this fault developing, but goods which had been in stock for any length of time should always be rescoured before dyeing. Even then the level-dyeing acid colors would be safer than the mordant colors.

Metallic stains were mostly from iron and copper, and occurred more frequently in milled goods than in plain clear-cut goods. They were the result of the sensitiveness of most of the fast-to-light mordant colors to these metals, and were always liable to occur in goods which had been scoured and milled in machines fitted with brass, copper, and iron parts.

Another fault took the form of marks or lines or streaks running irregularly warp way of the piece

These, in his opinion, were purely mechanical faults, and might be called a very mild mill-rig. It was a serious fault, and sometimes difficult to remove. It occurred both in crossbred and botany qualities, and he suggested that the fault started in the scouring machine through overcrowding and was aggravated in the dyehouse. If, through overcrowding in the scouring machine and the use of too little scouring liquor, the goods were unable to change their position, and were kept more or less in the same folds for the whole of the scouring process, then the liability to develop streaks was very great, and the subsequent dyeing would certainly not improve the goods.

There were other faults, such as those experienced by the dyer of union goods, cotton and silk-effect goods, and the difficulty of matching shades in daylight and artificial light; but he thought he had enumerated sufficient for the discussion that evening.

In reply to the Chairman (Dr. L. G. Paul), Mr. Hollingworth said that in speaking of carbonizing he meant carbonizing in the piece. Vitriol was usually used; he did not think aluminium chloride was used.

The Chairman said he thought aluminium chloride, which used to be largely used, would be advantageous after dyeing, because it would not have such a strong action on dyes as sulphuric acid.

E. Stapleton said that the "bagging" of pieces would not prevent them from being listed if listing were due to the causes Mr. Hollingworth had mentioned. If one got a very hard cloth, say 19-20 oz., 120 picks, running over the winch and kept in that position for most of the time it was in the bath, there was a possibility of listing through the dye being unable to penetrate. Opening the pieecs out with the aid of a stick was a very successful methods, but it lowered the output. In his opinion bagging was useless unless all the oil and size had been taken out of the piece, and the dye used was a suitable one.

J. Hollingworth said his view was that if a listed piece was the fault of the dyer, that fault could be corrected by dyeing subsequent pieces bagged; and also, if a flecked piece were turned out in the dyehouse, the only way to correct it was to bag it, strip it, and redye it bagged.

D. T. McLellan asked if any tests had been made to determine the relative amount of grease and soap on the lists and on the body of the piece. Were the pieces steamed after crabbing, because if the goods were not well set in the crabbing and steaming processes they were liable to have curled edges?

Mr. Hollingworth said there was very little crabbing in the Huddersfield district.

Mr. Stapleton said the list was darker than the body of the piece in nine cases out of ten. The pieces were not usually curled. Pieces had been frequently tested and an excess of grease found in the lists.

T. Lovelace said that recently he had followed up a case in which the warps had been sized, and also waxed as they went into the loom. Those pieces were standing in the gray room for a few days, and when dyed they showed light edges and light piece-ends. Was listing often caused in that way?

Mr. Hollingworth said that there were many inferior insoluble sizes on the market at present, and if the pieces were crabbed or put through any process which would tend to concentrate the impurity into one portion of the piece, that portion would be faulty.

R. Heaton said paraffin wax was used by the weavers—often an ordinary white candle. The wax could be removed completely by blowing with steam. In the astrachan trade the wax had to be used for every pick, and the rods had to be greased.

The Chairman said the wax could be removed by the solvent process.

Mr. Lovelace asked if burst warp or weft threads could not result from blowing with steam, but Mr. Heaton replied that that did not occur.

The Chairman said that with regard to the hardness of water, for the scouring of fine Huddersfield goods water of five or six degrees was too hard, and in his experience a number of defects such as spotty goods and stains had been due to that, also smelly pieces. Many people used permutit plants for such water.

D. T. McLellan asked if volatile solvents were used in scouring in the Huddersfield district, because that enabled less soap to be used, and there was less danger of leaving soap in the piece. He referred to tetraiene and similar products.

R. Horne said that they were in the habit of treating all goods which were received from commission scourers with a volatile solvent and warm ammonia, and this practice had been successful in reducing the listedness very much.

J. W. Thorpe said that many firms who had had much trouble with listing had absolutely eliminated it by using open-width scouring machines. The listing was due to unsaponifiable oil or insoluble size, which could not be got out by rope scouring, but was removed by flat scouring.

In reply to further questions, Mr. Thorpe said the process of open scouring did not lessen output. Twenty pieces per day could be done, with cloth weighing anything from 8 to 20 oz. and up to 66 in. width.

Mr. Hollingworth said they had two machines and got a fair amount of success, but not the output; certainly not twenty pieces a day.

Mr. Stapleton said the open scourer was good for a not too heavy cloth which had to be got out to width.

Mr. Thorpe said the width could be got up from 57 or 58 to 66 inches in an hour's scour. One disadvantage was the tension. The piece was lengthened two yards, and the finisher had difficulty in getting his weight. The machine did not mill at all, and the goods required no crabbing. No solvents or soda were used —only soap and ammonia. Two pieces were done at once.

Mr. Lovelace suggested that the machine would not pull if the back roller were speeded up.

The Chairman said Mr. Thorpe's remarks would

imply that listing was caused by something which a thorough scouring removed.

D. T. McLellan suggested that a piece should be sent to dry cleaners and thoroughly extracted and dyed along with other pieces which showed listing. That would prove conclusively whether grease was the cause of listing.

Mr. Mallinson said that they had had trouble with goods which showed a band six inches broad right across the piece every six inches. This was shown to be due to different yarns having been useed. When listing was due to a weaving fault, the threads being tighter in the center and slacker towards the list, would not an open width scouring machine tend to rectify that fault by pulling the cloth into position, whereas a rope scouring machine would emphasize the weaving fault?

H. Downs said he had found that in some cases oils had been used for blending which contained up to 40 per cent of hydrocarbons. In scouring the fatty acid was removed, but not the whole of the mineral oil, and the latter would possibly go towards the edges of the piece.

The Chairman said that at any rate in high-class goods very little oil was used except the high quality Gallipoli oil. He did not think Bradford spinners used anything but an entirely saponifiable oil.

Mr. McLellan said that in the Bradford trade the goods were crabbed and steamed, and when dark lists appeared they were attributed to the goods standing all night in a vertical position on the steaming can, and the size and grease running down to the edge

Mr. Heaton said he had been looking at some old books belonging to his firm dated 1826, and he found they were troubled with listed pieces then.

L. Barker said that if goods went straight from the scourer to be dyed it would prevent a good deal of listing

The Chairman said that two of the principal causes of irregularity were water and the nature of the oil.

Mr. Hollingworth said he had had an instance in which pieces had developed draught stain in coming from Bradford to Huddersfield.

H. E. Wood inquired if any class of color was more liable than another to cause listing.

Mr. Lovelace said acid dyes were rather more liable to cause trouble than chrome dyes.

VAT DYES FOR WOOL

Textilberichte, 1921, 2, 352, through the Journal of the Textile Institute:

The use of vat dyes for wool is recommended. The advantages claimed are: Better results, less loss in milling, improved fastness and elasticity of the wool when compared with chrome dyed colors. The low temperature of the dyeing operation maintains the wool in a soft and loose condition. The saving of coal is important: 100 lbs. of wool requires 34 lbs. steam for dyeing with vat volors, whereas a chrome dyeing requires above 340 lbs. of steam.

ELECTRIC AIR HEATING FOR TEXTILE MILLS

It has been an accepted fundamental principle that electricity could not compete with coal for the heating of buildings. Recent investigations have been made, says the "Electrical World," which show that electricity can compete with coal, taking all the facts into consideration, when energy is obtainable at one cent a kilowatt hour and coal is $8 a ton.

The Canadian Cotton Company of Canada, after a thorough investigation and examination, has entered into a contract for the electrical heating of one of the new mills it is building at Milltown, New Brunswick. The building is 184 ft. (57 m.) wide by 410 ft. (134 m.) long, two stories high, and has an installed capacity of 2,200 kw. for maintaining a temperature of 65 deg. Fahr. within the building when the outside temperature is 20 deg. below zero.

A hot-air system of heating is employed, this being recognized as the most effective manner of heating the building, besides providing good ventilation at all times. During the summer the system may be operated as a strictly ventilating system without the heat being on. This does not interfere with the humidifying system usually employed in textile mills, and as a matter of fact it should result in a more uniform humidity being maintained.

The heaters are concentrated into two centralized systems, one for each half of the building, and are placed in housings similar to those used with steam coils, the air being drawn through the heaters by a suction fan and distributed through the building by means of vent pipes.

Electric contact-making thermostats are used for maintaining the temperature constant within narrow limits. These, in connection with magnetic contactors, hold the temperature constant, continually and entirely automatically, at 65 deg. Fahr. throughout the entire twenty-four hours, irrespective of the outside temperature. The installation is thoroughly safeguarded, so that in the event of the power going off the motor driving the exhaust fans, the current is automatically cut off from the heaters. It is further safeguarded to the extent that if the temperature within the heater housing goes beyond a predetermined limit the heaters are automatically disconnected from the line. In the event that the temperature within the room should go beyond a given point owing to the possible failure of the controlling thermostats, a separately operated thermostat will cause the sounding of a loud gong, which will be sufficient to attract the attention of the watchman day or night.

By the electric heating of mills, particularly where water power is available, an enormous opportunity is provided for conserving natural resources, especially

coal. It is to be hoped that steps will be taken at once by those companies fortunate enough to operate plants deriving their power from waterfalls, or those that purchase power from water-power plants, to investigate the advantages offered by means of electric heating.

Fastness of Basic Dyes to Light

Sacrifice of Other Qualities to Obtain Light Fastness — General Attributes of Basic Dyes — Basic Dyes Possessing Good Light Fastness—Rhodamine B and Prototypes—Methods of Application—Resorcin Blue—Dyes for Tin-Weighted Silk and Application Methods—Notes

By GEORGE EMMONS

IN prior articles, particular attention was given by the writer to fastness to water and fastness to washing. But fastness to light has not been especially treated, although incidental attention has been given. In the present article, it is proposed to specialize on fastness to light. I hasten to point out that, in seeking this particular quality, some other quality will often have to be given up. There is probably no single dyestuff in all the world that possesses all the good qualities in a high degree. But fastness to light will sometimes become so desirable that reductions in certain other qualities become more or less endurable. This is particularly the case with silk.

In the first place the basic dyes are the most brilliant of the coal tar colors. They have a great affinity for silk fiber because of its natural acidity, and produce colors of great brilliance and beauty. Unfortunately, however, these dyes have, as a class, rather moderate fastness to light. This naturally restricts their use to such fabrics as will not in service be much exposed to light. There are, however, two or three or more basic dyes having a good fastness to light on silk, whatever defects they may have along other lines. I mention Rhodamine B, Rosazeine B, Safraniline, Ethyl Green, Malachite Green, Diphene Blue.

There are several other basic colors which produce on silk weighted with tin a very good fastness to light. I mention the following: Methylene Blue, Methyl Violet (reddish brands).

Of the foregoing, Rhodamine B, Rosazeine B and Safraniline, are all similar dyestuffs in respect to their constitution, and may be assumed to be more or less alike in their behavior. It will, however, not be safe to depend too much upon similarity. The following remarks apply especially to Rhodamine B. The dyeing is to be done as follows: The dye bath is prepared by using about 10 per cent of the volume in boiled-off liquor; or else in a bath which has been slightly acidulated with a suitable acid. This latter bath may contain boiled-off liquor, too. Acid in the bath is claimed to keep the color off the silk and to prevent exhaustion of the bath. In case the water is hard, acetic acid may be employed to correct this condition. If scum comes to the surface, it should be removed by skimming or otherwise, prior to entering the silk. Before putting in the dye, the silk is entered, the bath at the time being at a temperature of 40 deg. Cent. (= 104 deg. Fahr.). After it has been worked or turned for a short period, the dyestuff is to be put in in the form of a solution. The silk will have been removed before the dye is put in and then put back. The idea here is to prevent localized effects of the dye. The silk is now rapidly handled for a few minutes and the heat pushed up to 60 deg. Cent. (= 140 deg. Fahr.) and eventually to the boiling point. The silk may be dyed without boiled-off liquor. It is then entered at 60 deg. Cent. (= 140 deg. Fahr.) and the heat is afterwards pushed up to 80 deg. Cent. (= 176 deg. Fahr.). Enough acetic acid is to be added to exhaust the bath.

The shade produced on silk by Rhodamine B is not merely fast to light in a good degree, but it has also a good fastness to water. This latter fastness means that there is resistance to the loss of dye in the cold water in which a dyed sample has been immersed for twelve hours. The shades on silk are very bright and may be described as bluish-pink with a red fluorescence.

Bright red colors, beautiful and pure, may be produced by mixing Rhodamine B with azo oranges and azo scarlets.

The following dyes resemble Rhodamine B. Rhodamine G, Rhodamine 3B, Anisoline, Rhodamine 6G, Trianisoline, Rosazeine 6G.

Ethyl Green and Malachite Green may be regarded as more or less similar. Both produce on silk colors that have a good fastness to light. Perhaps Ethyl Green is somewhat yellower and more brilliant in shade. Malachite Green may be dyed in a bath prepared with one-tenth of its volume consisting of boiled-off liquor. This bath will be somewhat alkaline. This is to be corrected with sulphuric acid, but not to complete neutrality. The bath is to be slightly alkaline. The bath is to be heated 70 to 80 deg. Cent. (= 158 to 176 deg. Fahr.) and the color added in the form of a solution. After the bath has been well stirred, the silk is entered and worked or turned for, say, thirty minutes. It is then washed. Next, it is given a brightening treatment with acetic acid. Afterwards, the work is to be dried.

Either an acid or a basic color may be used in the

same dye bath along with Malachite Green for the purpose of modifying the shade. If Picric Acid is to be used with Malachite Green for the purpose of shading the latter, then it will be advisable that the dyeing with Malachite Green should be completed and the Picric Acid used subsequently for the topping operation.

Perhaps this is as good a place as any to call attention to the following silk dyestuffs Resorcin Blue, Fluorescent Blue, Iris Blue.

These are understood to be more or less alike, although my remarks will apply especially to Resorcin Blue. This dyestuff comes on the market in the form of an olive-brown liquid containing small, green crystals. The whole may be dissolved in water, when the color will become violet. Apparently, this dyestuff is not especially suitable for cotton and has no particular vogue amongst wool dyers. But silk is another matter. "It dyes this fiber with a blue-violet color of a remarkable reddish fluorescence which is seen very prominently in gaslight; when used in combination with other coloring matters it gives pleasing shades, all possessing fluorescence." The color produced on silk is very fast to light. Further, it has also a very good fastness to washing and acids.

The dyeing may be done in a bath, 10 per cent of whose volume consists of boiled-off liquor. Acetic acid may be used to acidulate the bath slightly. The color may be brightened by the proper use of acetic, tartaric or sulphuric acid.

Tin-Weighted Silk

If the silk be weighted with tin, then Methylene Blue and Methyl Violet (reddish brands) come into consideration, if fastness to light is demanded. The basic dyes in general have a good affinity for the tin-weighted silk fiber. This makes the dyeing easy. The silk is to be carefully washed in warm water for the purpose of getting rid of any bits of metallic salt that may be adhering to the fiber. If the silk has been weighted and has since been kept in stock for any considerable period, the metallic weighting may have suffered decomposition to some extent. If so, unevenness of shade may be the result obtained upon dyeing.

Methylene Blue and Ethylene Blue may be regarded as similar dyestuffs. Methylene Blue may be used with Methyl Violet, Malachite Green, Safranine, etc., to produce compound shades. In fact, the Marine Blues are mixtures of Methylene Blue and Methyl Violet. One authority does not recommend Methylene Blue very highly for use on silk to produce blue shades, his reason being the existence of other blue dyes which possess a higher degree of brilliancy and fastness. However, we are now concerned, not with the simple use of Methylene Blue, but with its employment on silk weighted with tin. The weighting of silk with tin is accomplished by the use of stannic chloride and sodium phosphate, the object in view being reduction in price. The weighting has to be done with much care, otherwise there is an unevenness of precipitation of the salts. This naturally will occasion uneven results in dyeing. Unevenness in dyeing may also be brought about, as already indicated, by a prolonged storage of the tin-weighted silk prior to the carrying out of the dyeing operation.

Silk that is to be weighted with tin may be treated in the raw state, "since it would have to be soaped again after being mordanted." The older methods proceeded by steeping the fiber in a solution of stannic chloride (having a density of 32 to 52 deg. Tw. = 1.160 to 1.260 sp. gd.) until thorough impregnation has taken place. The fixation of the tin is secured in the following way. The silk is wrung out, the excess liquor being put back into the bath, and then rinsed in running water. The object here is to secure precipitation of stannic hydroxide in the fiber. The removal of the soluble acid salt is accomplished by washing. Often, the fixation is brought about by a cold solution of soda. It is said that by repeated operations the weight of the silk may be increased to 25 per cent. The solution of stannic chloride is to have a moderate strength, as a solution having a strength indicated by 50 deg. Tw. (= 1.250 sp gr.) is competent to produce perceptible shrinkage of the silk; and one having a density of 100 deg. Tw. (= 1.500 sp. gr.) will effect initial dissolution of the fiber. It is necessary to soap repeatedly at the boil in order to get back the natural "feel" of the silk. The foregoing method may be improved by the use of sodium phosphate. That is to say, after the silk has been allowed to steep in the stannic chloride and has duly rinsed in water, it is given a treatment in a solution of sodium phosphate and then given a good rinsing. The phosphate solution is first to have a temperature of 50 to 60 deg. Cent. (= 120 to 140 deg. Fahr.). The silk is worked for half an hour at this temperature. Then it is worked for a second half-hour with the solution boiling. The treatment is given a number of times. In the final treatment, enough sulphuric acid is to be added to liberate a third of the phosphoric acid. This method is a double improvement, (1) because it does not injure the fiber to the same extent, and (2) because it produces a higher weighting effect. Indeed, the improvement may go further. In the older method, it was sometimes the custom to use tannin in the form of tannic acid, sumac, catechu or the like, as a second medium of weighting. This weighting was done subsequently to that effected with stannic chloride. It was supposed to have a beneficial effect by way of preventing deterioration of the fiber as well as by way of adding to the weight. When the treatment with stannic chloride is followed by that with sodium phosphate, the treatment with tannin becomes unnecessary. Consequently, "the white color, the gloss and the feel of the silk are much better preserved." Other improvements have been made, but I scarcely have space to describe them.

It has been claimed that if the tin-phosphate procedure is used in weighing silk, tendering that may oc-

cur later may be corrected by a treatment of the silk in a bath containing hydrofluoric acid.

The methods outlined for tin-weighting may be regarded as suitable both for light-colored as well as black silk.

In order to dye silk with Methylene Blue or Ethylent Blue, a bath containing boiled-off liquor to 10 per cent of its volume may be employed. After the dye solution has been added to the bath, the silk is entered. The whole is then heated to the boiling point and the dyeing prosecuted for twenty minutes at the boil. The silk is then washed and afterward brightened with acetic or tartaric acid. Finally, it is dried. The precaution of giving tin-weighted silk a washing in warm water prior to dyeng has already been mentioned.

Some Remarks

There is a small problem connected with the preparation of the dye solution which is destined to be added to the dye bath. If boiling water is used as the basis of the solution, trouble may ensue because of a partial decomposition of the dye and the consequent formation of tarry matters. Instead of plain water at the boiling point, one may advantageously employ warm water, to which a small addition of acetic acid has been made. In certain cases, it may be best to use a small quantity of methylated alcohol as an assistant in dissolving the dyestuff. Another assistant that is used at times is acetin. This is a mixture of the acetic ethers of glycerin and may be prepared by boiling glycerin with glacial acetic acid.

When using Auramine, the dye solution should not be heated up beyond 170 deg. Fahr. (= 77 deg. Cent.). Otherwise, the dye will be more or less decomposed and a precipitate formed.

Bismarck Brown and Chrysoidine may both be used for silk. The solution should, however, not be boiled for any length of time. Bismarck Brown produces a bright shade of brown which resembles the shade produced by Catechu, only it is redder. But the color lacks fastness to light and soap. Both Bismarck Brown and Chyroidine may be dyed on silk in the same manner. That is, a weak soap bath at 50 or 60 deg. Cent. (= 122 or 140 deg. Fahr.) may be used for the dye bath. After the fiber has been dyed in it for half an hour, it is washed and then brightened with acid—acetic, tartaric or sulphuric. Finally, the work is wrung and dried. Both dyes are soluble in plain water. Bismarck Brown may be properly prepared for use by dissolving it in water containing no lime, or in water in which the lime content has been neutralized by the addition of acetic acid. A temperature of 80 deg. Cent. (=176 deg. Fahr.) may be employed in dissolving the color. The resulting dye solution may be kept for a period, but not indefinitely. A slow decomposition takes place spontaneously.

While fastness to light has been emphasized in the present article, it should be remembered that it is also desirable to have fastness to water—that is, immunity against bleeding after a steeping in cold water for twelve hours. Basic dyes are not naturally strong in this respect. But their ability to be fast to water may sometimes, at least, be increased by working the dyed silk for a quarter of an hour in a bath containing from 5 to 10 per cent of tannic acid, the bath being at a temperature of 140 deg. Fahr. (= 60 deg. Cent.). Next, the work is squeezed and then worked in a bath containing from 2½ to 5 per cent of tartar. The silk is next allowed to steep for twelve hours, after which it is washed thoroughly and dried.—*Silk.*

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

T. C.—*Question:* I am dyeing fancy shades with fast acid colors and always note that my batches dry up to a different shade than my sample. This causes a great deal of trouble and I would appreciate it if you could explain the possible cause.

Answer: It is a well-known fact that practically all dyestuffs, both direct and acid, as well as other varieties, are altered in tone by heat. The main cause of this is the simple loss of moisture due to drying, which, when the fiber regains its normal condition, allows the shade to return. However, there are some dyes that are permanently changed, and at the present time there are some containing traces of impurities which cause a permanent change in dyes which, under ordinary conditions, are not affected by heat. The heat conditions under which you dry your samples are possibly not identical with the conditions in your regular dryer, and this may possibly account for the variation in shade.

W. M. O.—*Question:* We have had much difficulty in dyeing navy blues on cotton fabrics, using Blue 2B, Direct Black and Benzo Purpurine 4B. Every lot shows bronzy streaks, although the dyeing appears to be as even as possible and is well rinsed. What causes this, and what remedy do you suggest? We have tried dyes from practically every dealer in the business.

Answer: The trouble you mention is caused by the water in the goods which, in the heat of the drier, redissolves the dye off the fiber and, by capillarity, flows to

the edges and dries. So much dye is dissolved off the fibers in this way that the points where it dyes become bronzy from the excess of dye at those places. The best remedy is to set the dye, or make it insoluble, by a rinse in weak acetic acid or alum, before whizzing and drying. Another remedy is to use Black BH as a basis of navy blues.

C. R. S.—*Question:* How are colors fast to hot soap and light dyed on thread silk?

Answer: A few are diazotized and developed dyes and a few are vat dyes, but the majority of browns, grays, modes, etc., are chrome mordant colors. This is shown by the green ash left on burning a sample of the silk.

The boiled-off and dried silk is laid overnight in a solution of chromium chloride of 20 deg. Tw., then whizzed and fixed in a bath of 1 to 2 deg. Tw. of sodium silicate, or sometimes sodium phosphate; then rinsed well. The dyeing is done in a neutral, broken soap bath with the ordinary mordant dyes, either azo or alizarine, at a temperature just below a boil. If the bath is distinctly acid the results will not be as satisfactory, as the dye then goes on as an acid color without properly uniting with the chrome. It is not practical to dye after-chrome colors on silk, as the fiber is injured by the action of the bichromate.

W. W. A.—*Question:* Will basic dyes color unmordanted cotton under certain conditions?

Answer: Yes. Light tints of good fastness to washing may be obtained on cotton that has been bleached, but not on raw cotton. Fuller shades may be dyed from an alum bath, even on raw cotton, but are likely to rub. Shades have been made using basic dyes, tannin and acetic acid in one bath, but these are hardly practical.

W. L. J.—*Question:* How much Metatoluylenediamine is actually required to develop a full shade of black?

Answer: Practical trials have shown that between one-half and three-quarters per cent are needed, but actually one per cent is used, so that there is sure to be an excess and so that the operation of developing will not take too long a time. If the theoretical amount only were used there would be a danger that the interior of the fibers would not be developed and the time necessary for the reaction would be unreasonably long. With an excess, the development is complete in a few minutes and there is little chance that it is not thorough.

The New Jersey Silk Knitting Company, West New York, N. J., has recently leased a part of a factory at Fifteenth and Washington Streets, in which it will install special Milanese, fast tricot and special tricot, as well as Jacquard, Raschel machines for the manufacture of lace novelties, veilings, goods for hosiery and underwear, gloves, shawls and worsteds.

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

1154.*—A firm of dry goods dealers in Canada wishes to purchase women's ready-to-wear dresses of cotton or silk, quilts and cretonnes. Quotations should be given f. o. b. port of shipment. Cash to be paid. References.

1184.‡—A commercial agency firm in Germany desires to secure the representation of firms for the sale of raw products such as cotton, cotton waste, linters, chemicals, oils, tobacco, rubber, wood, coal, iron and steel, and metals. References.

1166.†—A commercial agent in Argentina desires to secure an agency for the sale of dry goods, hardware, tin plate, tinfoil, foodstuffs, chemicals, etc. Reference.

1167.*—A merchant in Austria desires to purchase dyed leather of every kind, especially leather for upholstering purposes; and to secure an agency for the sale of leather goods. Quotations should be given c. i. f. any German port. References.

1168.*—An industrial company in Guatemala desires to purchase complete machinery for the manufacture of jute sacks, as openers, softeners, carding, drawing frames, spinning, warping, looms, and dampening, pressing, sack-cutting, and sewing machines, for an output of 2,000 bags per day; paper and pulp making machinery; and tractors and cultivating machinery. Quotations should be given f. o. b. New York or New Orleans. Cash to be paid. Reference.

1170.*—There is a market in Spain for dry goods of all kinds, especially woolens, muslins, flannels, linens, canes, umbrellas, travelers' articles, perfumes, toys and notions. Quotations should be given c. i. f. Spanish port. Correspondence should be in Spanish. References.

1171.*—Iceless refrigerators are desired by a mercantile firm in Canada. Quotations should be given f. o. b. shipping point. Cash to be paid. Reference.

1172.*—The purchase is desired by a firm of merchants in Arabia of starch, cotton piece goods and general hardware. Quotations should be given c. i. f. Arabian port. Reference.

1087.*—An agency is desired by a mercantile firm in South Africa for the sale of textiles, general hardware, groceries, foodstuffs, and advertising novelties. References.

910.*—The purchase is desired by a merchant in England of sheetings. Quotations should be given f. o. b. New York. Terms: Payment against documents. Reference.

961.*—An agency is desired by a merchant in Austria for the sale of raw cotton for mills. Quotations should be given c. i. f. German port. References.

UNEVEN COLOR ON DYED SILKS

Unevenness of color can often be attributed to uneven weighting, uneven distribution of the dye, or variation in the size of the raw stock. There may be substances introduced into the silk which will not come off in the usual boiling-off or degumming process. If a piece of shady silk is submitted to a chemical test or analysis the percentage of dye, amount of weighting and other substances can be determined and the cause of the defect will be apparent.

The throwster may use an excessive quantity of oil and soap, or even grease, which is fixed in variable proportions on the fiber in the dyeing process. This may often cause the dyer a great deal of trouble and cause streaked silk, either directly by not taking the dye evenly or indirectly by causing overworking of the silk to obtain the desired shade. The oil, soap and grease present can be determined and the manufacturer should have his thrown silk inspected or analyzed before being sent to the dyer. The writer knew of a case where raw silk that happened to be a fine large thread was found to be treated with rice powder to make it bulky, when in reality it was a very slender fiber.

An excess of fat may be present on the raw silk and not only cause trouble in subsequent operation, but cause the buyer to pay for this at an expensive rate. Some silk has been known to contain over 8 per cent of fat, as against the normal 1 per cent contained in the original fiber. The percentage of ash from silk is of some consequence as it shows the amount of mineral matter present. If the percentage of ash is above the normal it shows that there is a mineral loading present.

A very prolific cause of unevenness in dyed goods of all kinds is the lack of proper cooling and conditioning after finishing, and many of the leading silk mills have installed a machine which prevents trouble from this source.

Nearly all the trouble encountered by manufacturers, dyers, finishers and throwsters can be determined and the cause of the defect traced to its proper source. The manufacturer should protect himself by having all raw, thrown and dyed silk analyzed before accepting it as a good delivery, and by having suitable equipment.—"Textile World."

Review of Recent Literature

The Book of the World Cotton Conference. Official report of the meetings held June 13, 14 and 15 at Liverpool, and June 16-22 at Manchester, 1921. 436 pages, 9 x 12. Published by the Executive Committee, 121 Deansgate, Manchester, England.

As is customary, this volume forms a complete and permanent record of the proceedings, addresses and personnel of the various committees of this event, and contains many interesting and valuable contributions to the literature of the cotton industry by recognized authorities. The addresses, which form the major portion of the record, include the following: "How Can the Quality of the American Crop Be Improved and the Supply Be Kept Adequate to the Demand?" by David R. Coker; "The Exploration and Development of New Cotton Fields within the British Empire," W. H. Himbury; "Universal Standards for American Cotton," William R. Meadows; "The Problem of Financing American Cotton for European Use," Willis H. Booth; "The Purchase and Sale of Cotton," A. Bryce Muir; "International Credits," Sir Drummond Drummond Fraser; "Financing Cotton Imports," Sir James Hope Simpson; "Yarn and Cloth Contracts," John Taylor; "Characteristics of Cotton Required by the Spinner and Present Defects in the Raw Material," William Howarth; "Quality and Nature of Cotton Yarns Used by the Hosiery Trade," William Davis, M.A.; "The Cotton Mill; Its Machinery and Equipment," A. J. Holt; "Comparative Statistics of the Textile Industry," Melvin B. Copeland; "The Scope of a Research Institute for the Cotton Industry," Dr. A. W. Crossley, C.M.G., C.B.E., LL.D., F.R.S.; "Cotton Statistics and the International Institute of Agriculture," Professor Umberto Ricci; "The Possibilities with Cotton Crops for Exact Reporting and Forecasting," W. Lawrence Balls, M.A., Sc.D. (Cantab); "Humidity and Ventilation in Cotton Weaving Sheds," Frank Scudder, F.I.C., F.C.S.; "Preparation of Cloth for Finishing," S. H. Higgins and Andrew Hodge; "Factory Accidents and Their Prevention," John Jackson, O.B.E.; "Hours of Labor in the Textile Industry," A. Thomas; "Transportation of Cotton," Arthur Watson, C.B.E., M.Inst.C.E.; "Financing the Mills," E. T. Parkes; "Economic and Insurance Necessity of Future Contracts," Edward S. Butler; "Needed Reforms in the Ginning, Baling and Compressing of Cotton," Albert L. Scott and F. S. Blanchard;

"Cotton Waste and Its Value as a Raw Material," J. Barber Lomax.

In addition to a complete record of the resolutions growing out of this conference, there is also given in the report a voluminous statistical appendix consisting of six sections dealing with statistics of Production, The American Crop, The Indian Crop, Egypt, Consumption and Prices. The consumption and prices statistical matter includes a classification of the world's cotton, the world's cotton 1902-1920 crops, and a summary of the smaller crops; the world's mill consumption, 1894-1921, balance of world's production and consumption, 1904-1921, world's consumption by countries, 1906-1913, world's consumption by countries and varieties, 1912-13-20-21, American consumption by varieties, annual, 1909-1921, and monthly, 1918-1921; history of cotton prices, 1770-1920, with index numbers, monthly spot prices of American and Egyptian in Liverpool, Alexandria and New Orleans, 1909-1921, monthly spot prices of various kinds of cotton in Liverpool, 1913-1921.

Distillation Principles and Processes. Sydney Young, M.A., D.Sc., F.R.S. 520 pages, 6 x 9; 200 illustrations; $10.50. New York, D. Van Nostrand Company.

This is an exhaustive treatise written by chemists thoroughly conversant with the manufacturing conditions existing in the various industries, especially the new methods evolved out of the necessities of enormous production during the war period. In preparing it, the author, who is Professor of Chemistry in Dublin University, had the collaboration of Lieut.-Col. E. Briggs, D.S.O., D.Sc., T. Howard Butler, Ph.D., M.Sc., F.I.C., Thomas H. Durrans, M.Sc., F.I.C., Hon. F. R. Henley, M.A., F.I.C., and Joseph Reilly, M.A., D.Sc., F.R.C.Sc.I., F.I.C.

The contents include: Introduction, Apparatus Required; The Boiling Point of a Pure Liquid; Vapor Pressures of Mixed Liquids; Boiling Points of Mixed Liquids; Composition of Liquid and Vapor Phases; Experimental Determinations; Directions for Carrying Out a Fractional Distillation; Theoretical Relations Between the Weight and Composition of Distillate; Relation Between the Boiling Points of Residue and Distillate; Modifications of the Still-head; Bubbling Still-heads; "Regulated" or "Constant Temperature" Still-heads; Continuous Distillation; Fractional Distillation with an Improved Still-head; Distillation on the Manufacturing Scale; Fractional Distillation as a Method of Quantitative Analysis; Methods by Which the Composition of Mixtures of Constant Boiling-Point May Be Determined; Indirect Method of Separating and Components of a Mixture of Constant Boiling Point; General Remarks, Purposes for Which Fractional Distillation Is Required. Interpretation of Experimental Results. Choice of Still-head, Number of Fractions, *The Manufacturing Scale*—Acetone; Production of Acetone and *n*-Butyl Alcohol by the Fermentation Process, Production of Acetone by means other than Fermentation, Acetone Recovery; The Testing of Acetone and *n*-Butyl Alcohol. *Distillation of Alcohol on the Manufacturing Scale*—Distillation of Mixtures of Ethyl Alcohol and Water (Theoretical); Distillation of Mixtures of Water and Ethyl Alcohol, with the Other Volatile Products of Fermentation; Stills and Distillation in Practice; *Fractional Distillation as Applied in the Petroleum Industry*—Introduction; Periodic Distillation; Continuous Distillation Under Atmospheric Pressure; Distillation Under Reduced Pressure; Various Distillation Methods; *Fractional Distillation in the Coal Tar Industry*—Introduction, Distillation of Tar; Further Distillation and Rectification of Primary Fractions of Tar; Fractional Separation of the Naphthas and Light Oils; *The Distillation of Glycerine*—The Distillation of Glycerine. *The Distillation of Essential Oils*—Theoretical, Steam Distillation; Technical. Preparation of Raw Materials; Distillation; Purification of Essential Oils, Appendix.

Introduction to Textile Chemistry. H. Harper. Macmillan & Co., Ltd. 3s. 6d. net.

This is a volume from Macmillan's "Life and Work Series." It gives a short account of the more important properties of the principal textile fibers and the materials used in their treatment; but the chief object of the book is to provide a series of experiments illustrating these properties, in order to interest students in various branches of textiles in the materials with which they deal. All the experiments outlined can be carried out with the equipment found in an ordinary chemical laboratory. The use of the microscope in measuring and examining textile fibers is dealt with, and the methods of carrying out experiments to determine or verify the characteristic properties of fibers. The effect of chemical reactions and various agents on textile fibers is dealt with in a suggestive manner. Notes are given on methods of identifying the different textile fibers. Brief notes are given on the properties of oils and soaps, water, testing for hardness, and water-softening plant. In a separate chapter a brief description is given of the chemicals in most common use in textile work and the purposes they are used for. Tabulated data and a glossary of terms complete the book, which represents very good value for the modest price charged. The book is really intended for the use of junior students in continuation schools, but contains much information that would be of service to textile students attending the evening schools.

Harry Whittaker, of Northborough, Mass., and Robert Whittaker and Anna T. Whittaker, of Westborough, are the incorporators of the Robert Whittaker Company, Northborough, Mass., incorporated, with a capital of 500 shares of no par value, for the manufacture of wool and woolen and worsted mill waste, shoddy, noils and waste. The new company will take over the machinery and plant formerly occupied by Whittaker & Bacon, Inc.

Recent Patents

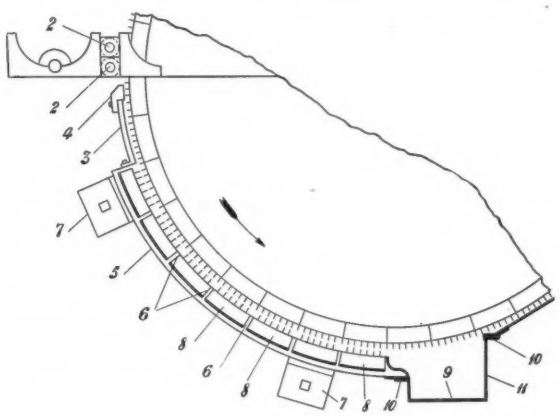
Fiber Treating Machine

(1,407,364; February 21, 1922)

HENRY HIRST WALLER, Harrowgate, England

This invention relates to machines for opening all kinds of thread work, cotton, woolen, worsted, rags and the like, of the type in which a toothed cylinder or swift revolving in a casing receives from feed rollers the material, which then passes partly around the cylinder, between the cylinder and the casing, this operation being usually repeated in a set of several successive scutchers or opening machines in series.

Operator secures to the inner surface of the casing under the cylinder a metal segment having six or other numbers of ribs, between which ribs he secures to the



segment toothed lags, the teeth on which are just cleared by the teeth of the rotating cylinder. The cotton or the like in traveling through the machine is thus exposed to the combined action of the stationary teeth on the segment and the revolving teeth of the cylinder, and the lower layer of the traveling cotton not being shielded from teeth by the upper layer as before, the opening effect is so much increased that the operation can be performed as well by a series of a less number of cylinders or swifts as it has previously been by a greater number. A great economy in plant, floor space and motive power is thus effected. Further, the finished material is of much more value, owing to the preservation of the staple and the avoidance of neps and knots. A trough or tray is fixed slightly beyond the vertical plane of the center of the cylinder, and the further edge of the said trough, or the flange of the machine casing in which the said trough slides is slightly higher and at a slightly less radial distance from the center of the cylinder than the edge of the rib on the above-named segment which is next to the trough, this arrangement allowing the most effective action of the trough.

In the drawing, the reference numeral 1 indicates a portion of the large swift, 2 2 the feed rollers, 3 the usual knife below the feed rollers, the upper wearing face of which knife is preferably formed on a renewable edge piece or bead 4. A metal segment 5 having ribs 6 is secured by brackets 7 to the under-casing of the machine (not shown) and between these ribs 6 are secured lags 8 provided with teeth opposing the teeth on the swift. By this arrangement the toothed lags are prevented from working loose in such manner as to interfere with the proper action of the machine.

The sliding trough or drawer tooth trap 9, which can be drawn out at the side of the machine from its guides 10, has its further side 11 arranged as shown to form a "cliff" against which are thrown loose teeth, broken pieces of lags, pins, screws and other hard materials, which then fall back into the trough.

Claims are granted as follows:

1. In an opening machine, a revoluble toothed cylinder, feed mechanism for supplying material to be treated, a stationary segment arranged below the feed mechanism and provided with ribs, and toothed lags arranged between the said ribs and co-acting with the said cylinder to treat the material fed between them and the cylinder.

2. The combination, with an opening machine constructed as set forth in claim 1, of a removable receptacle for catching hard rubbish discharged with the treated material, said receptacle being arranged at the lower end of the said segment under the said cylinder.

Apparatus for Dyeing

(1,407,387; February 21, 1922)

WADE H. DAVIS, Walnut Cove, N. C.

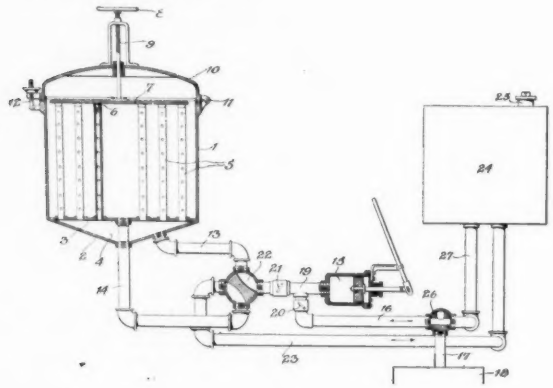
This invention appertains to an apparatus for treating yarns with liquid and is particularly designed for bleaching or dyeing. It comprises the particular form of kier illustrated in inventor's generic application Serial No. 178,717, filed July 5, 1917, as illustrated in Figure 1 of that application.

The drawing shows a cross section through the improved apparatus and illustrates partly in section and partly in side elevation the associated mechanism for forcing the treating liquids through the yarn or like fibrous material charged in the kier. (See next page.)

A kier 1, having a conical bottom 2 and a false bottom 3 spaced therefrom forms a chamber 4. Communicating with the chamber 4 by being inserted through the false bottom 3 are holders 5, having perforations or composed of foraminous material whereby liquor introduced into the chamber 4 may be passed up into the holders 5 and expelled therefrom through the perforations or interstices of such spindles.

The holders are preferably closed at their upper ends in any approved manner. As shown in the drawing, the closure is in the form of plugs 6 secured to the holders 5, whereby when such follower 7 is depressed the fibrous material, as for instance yarn, which is wound about the holders 5, may be subjected to pres-

sure to compress the entire mass to substantially uniform density. The compression of the fibrous mass may be accomplished by moving the follower in any approved manner, as by the use of the handwheel 8 and screw 9, said screw having a swivel connection with the follower plate 7.



To carry out the process, it is desirable that the kier be sealed watertight, even to water under pressure and, while this may be accomplished with any usual and ordinary form of mechanism or apparatus, the drawing shows a cover 10, hinged to the kier 11, and with a compression screw 12, whereby a water-tight joint in substantially the usual manner is provided.

Communication with the chamber 4 is provided through a pipe 13, while communication with the interior of the kier 1 is provided through a pipe 14. It is obvious that liquor introduced through the pipe 13 will first fill the chamber 4 and then flow upwardly through the spindles 5 and outwardly through the perforations or interstices into the interior of kier 1 and outwardly through the pipe 14; and reversing the flow, the liquor would be introduced through the pipe 14, filling the interior of the kier 1, flowing inwardly through the perforations of the holders 5 to the chamber 4 and outwardly through the pipe 13.

It is desirable to provide a forced flow of the liquor in either direction as indicated, through the pipes 13 and 14. It is also desirable to first introduce into the kier plain water, preferably hot water, for the purpose of initially wetting, soaking or softening the fibrous material, before the bleaching or dyeing chemicals or pigments are applied. For this purpose, a pump 15 is employed, communicating through the pipes 16 and 17 with a reservoir 18, which may contain clear water or other liquor for the initial wetting or soaking of the fibrous material. The liquor which for this reason may be referred to as "water" is drawn through the pipes 16 and 19 into the pump 15 and, by reason of the interposition of the check-valves 20 and 21, the flow from the pipe 16 is expelled from the pump 15 into the four-way valve 22. With the valves set in the position as shown in the drawings, the flow will be through the pipe 13 into the chamber 4 and in and out through the kier 1, as previously described. When passing out through the pipe 14, the flow is by reason of the position of the four-way valve 22 directed into the pipe 23 and thence into the tank 24.

The tank 24 is provided with an inlet enclosure 25, whereby dyeing or bleaching material may be introduced into the tank 24, so that as the water flowing outwardly through the pipes 14 and 23 is introduced into tank 24, it takes up and becomes the fluid vehicle for the dyeing or bleaching material contained in the tank 24. When the tank 24 and kier 1 have been filled with water from the reservoir 18 to the desired pressure, which experience indicates as preferably at about 30 pounds per square inch, the three-way valve 26 is moved to the position shown in the drawing, whereby communication with the reservoir 18 is interrupted and communication between the pipes 16 and 27 established. The continued action of the pump 15 will thereafter draw the fluid vehicle from the tank 24 through the pipes 27, 16, 19 and 13 into the kier 1, returning through the pipes 14 and 23. The path of the fluid vehicle as thus established is outwardly through the holders 5 and thus outwardly through the cops of yarn or fibrous material carried upon the holders 5.

For the purpose of uniformity of dyeing or bleaching, it is desirable to reverse the flow of the dyeing or bleaching fluid, which is accomplished by reversing the four-way valve 22, the flow of fluid vehicle being thereby established from the tank 24 through the pipes 27, 16, 19 and 14 to the kier, returning through the pipes 13 and 23 to the tank 24. The four-way valve may be reversed as often as found desirable throughout the cycle of operation, thereby reversing the flow of the fluid vehicle at such intervals as experience and practice demonstrate as desirable.

The development of pressure upon the fluid vehicle tends to force the processing fluid into engagement with all the fibers of the fibrous mass, while the continuous flow and especially the reversal of the flow of the fluid in opposite directions overcomes any tendency of sedimentation or other damaging results due to stagnation of the fluid. It also provides for the wetting or soaking of the fibrous material under pressure and, without opening the kier, the introduction of the dyeing or bleaching material, and the continuing of the process until sufficiently treated.

Claims granted are as follows:

1. In an apparatus for treating yarns and the like with a liquid, a container having an open top, a plurality of yarn holders arranged in parallel relation extending toward said top, said yarn holders being adapted to permit liquid to enter them and to issue therefrom throughout their lengths, a cover for said container, a follower plate having an under surface of an area sufficient to cover the tops of said holders, a threaded rod swiveled to said follower plate and projecting through said cover, a threaded member carried by said cover through which said threaded rod extends, means whereby said threaded rod may be ro-

(*Continued on page* 277.)

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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PROCEEDINGS OF THE A. A. T. C. C.

MEMBERS and other readers are notified that owing to the dearth of meetings during the two-week period elapsing since the preparation of the last issue for the printer, the section devoted to Proceedings of the American Association of Textile Chemists and Colorists has been omitted. It will appear in the April 24 number, and will include the final part of "The Development of Tests for the Fastness of Dyestuffs" (Murray).

Meetings scheduled as we go to press include that of the Council, which will be held Friday, April 14, 1922, at the Engineers Club, Boston, Mass., at 4 P. M.

A meeting of the Research Committee will be held at the same place at 4.30 P. M. of the same day.

The date for the "experience meeting" of the Northern New England Section, announced in the last issue, has been definitely set at 5 P. M. on Saturday, April 22. The subject under discussion will be "Shady Goods," and in this connection the attention of members is called to the reprint on page 259, this issue, of the discussion "Technical and Practical Faults in Wool Dyeing," held by the Huddersfield Section of the Society of Dyers and Colourists, which is given as being of interest to those contemplating taking part in the forthcoming meeting.

THE PROPOSED EXTENSION OF LICENSING

AS compared with its real needs, the present status of the coal-tar dye industry in this country still leaves a very great deal to be desired. As compared, however, with the outlook a year ago, its status has been slightly improved by the action of the Senate Finance Committee in voting, six to four, to recommend the extension for one year from final date of approval, of the present licensing system of protection, and the decision of the committee likewise to recommend the adoption of Senator Smoot's proposal for duties of 7 cents per pound specific and 50 per cent ad valorem on intermediates, and 7 cents per pound specific and 60 per cent ad valorem on finished products, same to take effect at the expiration of the one-year extension of the licensing system.

In addition, it is expected that in the forthcoming bill there will be provisions authorizing the President by proclamation to increase to the extent of 50 per cent rates of duty when found to be ineffectual in protecting American industries from foreign competition where there is an equality in the matter of labor and raw material costs. The new law will also have a provision dealing with unfair practices in import trade, in much the same way as there is now in the Federal Trade Commission Act a section dealing with unfair practices in domestic trade. With these new provisions of law the interests of the dye manufacturers will at least be better safeguarded than under any of the former tariff acts.

This decision of the committee is admitted to be a compromise, and it must yet be approved by the Senate and again by the special joint conference committee of the Senate and House. At the same time, however, it is understood that this recommendation was not decided upon before the whole matter had been threshed out in private to a sufficient degree to assure the necessary support. It is believed that there will be a safe majority in support of the new measure—safe enough to insure its becoming a part of the Fordney permanent tariff. Since, therefore, the present licensing period, under the Fordney emergency tariff, must continue until a substitute is enacted, and since it is likely to be several months before the permanent tariff is "signed, sealed and delivered," it is the general opinion that the licensing system will be with us for some eighteen months all told before the industry is set adrift in the Smoot lifeboat—which is an open one and scarcely staunch enough to weather the buffeting it will receive from the Cartel.

In eighteen months, however, much can be done. And that something will have to be done is the opinion of the majority of smaller dyestuff manufacturers, whose viewpoint is given in a telegram from Dr. S. Isermann to Chairman McCumber of the Finance Committee. This view is an important one. Dr. Isermann wired as follows:

"Your committee having decided to extend the emergency tariff for one year, in view of the fact that I represent about 50 of the smaller dye and chemical manufacturers from different parts of the country, I immediately got into touch with a number of them.

"The sentiment expressed by most of them, and I am one of them, is that while one year's extension might be helpful to companies with large capital, as they could afford to gamble on future protection, as far as the smaller man who is limited in capital is concerned, he surely will not be placed under such protection in a position to procure additional capital to keep his business going and to further extend and develop the industry.

"Even now he is having trouble because of present conditions. One year's extension is not adequate for his protection. It will give him a chance to liquidate his business, but will not afford the opportunity he must have for development.

"We know it is the intention of the committee and the Congress to preserve the industry in the United States. I also know and we all feel that the committee is not in favor of serving the few large interests and sacrificing the 200 smaller manufacturers of synthetic organic chemicals, but extension for one year will inevitably bring about this result."

In other words, then, those Congressmen who have feared that licensing would cause monopolistic tendencies in the industry if maintained too long, are in reality doing more to encourage a monopoly by shortcning than they would by extending it. And it further means that the dye protection question is not to be removed from the realm of politics.

All this is unfortunate. The uncertainty as regards the future is as great as ever. The status of the industry, to be strictly literal, has been "improved" So has the status of a pauper who has just received a quarter for a night's lodging. But he still remains a pauper and the industry still remains without any assurance of a protective period sufficient to enable it to do without special protection after the year, or eighteen months, is ended.

Some will say that the dye industry, as a whole, ought to be grateful for the favor shown it. This reveals a fundamental misconception of the situation. The dye industry is not seeking a "favor" and it is a serious mistake to allow any one to put its request on this basis. It has the same privilege of petitioning Congress for what it conceives to be its peculiar rights as any other industry. This privilege is a part of our American form of Government, which also reserves to Congress the privilege of of denying such petitions if in its judgment they ought not to be granted. Theoretically, Congress is a machine, and has no right to become impatient no matter how many times it is asked the same thing—which some seem to forget. Neither Congress nor any one in the dye industry have any right to regard the granting of a legitimate petition as a "favor."

Let us have done, therefore, with the shamefaced attitude occasionally encountered in the trade. The action of the Senate Finance Committee opens up a fresh vista of the same old, never-ending struggle for an American principle. Let the dye industry begin now to renew its campaign for adequate protection until that end is attained.

"IN THE SHADOW OF THE GUNS"

While the American dye industry is a lusty youngster, it still is more or less in the infant class and deserves all possible encouragement and protection so far as conforms with the anti-monopolistic principles of our Government. One need only hark back to the years of war to realize this.—*Washington (D. C.) Herald.*

THE GOAL OF COAL-TAR CHEMICAL RESEARCH

THE establishment of the coal-tar dye industry in such industrial countries as the United States and England, necessarily involves a vast amount of preliminary work which is nothing more than a reproduction of results which have already been attained in Germany, and in the effort to meet the requirements of the users of coal-tar colors, the first and principal urge was in the direction of giving them what they had been in the habit of using, the absence of which was making itself felt when the war broke out with disastrous results.

But this, we are reminded by "Dyestuffs," organ of the National Aniline & Chemical Company, should not, however, be the final goal of our chemists, and the mere creation of a coal-tar dye industry which will compare favorably with what was known before the war should not lead to a complacent belief that the situation has been met and provided for.

The organic chemical industry, this publication further points out, is not a completed science. It is in its infancy, and hence the point is altogether well taken that "if the story of William Henry Perkin teaches anything to present-day chemists, it teaches the value and importance of constant and patient research."

That, perhaps, is one of the most important and at the same time least considered reasons why the grievous three-year delay of Congress in acting upon the question of adequate protection for the American coal-tar chemical industries—quite irrespective of the final outcome—has worked such great harm to those industries. The fruits of research are necessarily slow in appearing; it is usually a matter of years before the full benefits are reaped. The investment of capital in research is distinctly an investment in the future. Lack of research is not noticed immediately, but all the same it is constantly militating against advancement and will inevitably show itself in a most startling and disagreeable fashion in the competition of to-morrow. It is more or less analogous to an attempt to make bread without yeast. The substance may be there, but when the real test of its fitness for service to mankind comes, it simply won't stand up for lack of an essential ingredient, and so is a flat failure and an example of much energy expended for—nothing!

Two things are necessary to the success of the coal-tar industry in this country—that is, success as measured by its ability not only to stand up in competition with foreign industries, but to continue its progress past the point already attained by the industry in Mittleeuropa. The first is research of the persistent and thorough kind carried on by Perkin—and subsequently by Germany. The other is a guarantee of adequate protection for a period long enough to permit of that research being realized upon.

And since, as before noted, it takes at least several years for the effects of research to be felt, it is obvious that even the most courageous business men will not

care to invest their money in research which is likely to be cut off untimely by a whim of Congress. Hence, the uncertainty of the past three years has brought research in our coal-tar chemical industries well-nigh to a standstill.

It matters not that the protection which existed at the opening of the controversy has been suffered to endure three years, and that it may possibly be allowed to go on for one year more. On several occasions it has escaped annihilation by only the narrowest of margins, and often at the eleventh hour. It has been this lack of certainty which has prevented the industry from enjoying the progress it might have accomplished. Could the dye makers, in the Spring of 1919, have known that they would be protected from the onslaught of a huge, organized monopoly for four years, the spring of 1923 might have seen them almost at a point where they could discard much of the still necessary governmental restrictions. But they could not know; Congress was too much afraid of political consequences—or of its own inability to tell the truth to certain constituents—to think of doing anything so simple and straightforward, and that is the main reason why it is still, with good cause, being importuned for further extensions of the licensing system or the substitution therefor of a less onerous but equally effective form of embargo.

The work of William Henry Perkin will continue to be an inspiration both to the student of chemistry and the advanced worker. The depths of the coal-tar industries are as yet unplumbed; there is plenty of young blood, intelligence and energy in the country to advance the science to new and, in all probability, unsuspected fields of usefulness to mankind. The schools and universities are ready to train them, and business is ready to finance them.

All they lack is the incentive that comes with the knowledge that this field can provide them with a career—a life work—here in their own country.

CAPITALIZE THE SILK SHOW AND SILK WEEK PUBLICITY

REVERTING to the 1923 Silk Exposition, concerning which a reminder was given in these columns in the last issue, it is felt that an additional word or two might not be out of place at the present time, even though the affair will not take place until next February.

Reports now being received by the committees in charge indicate that the entire trade is enthusiastic over the prospect, and this is evidenced in no uncertain fashion by the rapidity with which space is being reserved. Even at this early date, all space on the main floor has been spoken for by last year's exhibitors, with the exception of such areas as were originally allotted to foreign firms; and many of the 1921 exhibitors have this year engaged more space than they before occupied. "The Story of Silk," that colorful pageant so popular at the Exposition last year, will be repeated, and The Reporter is glad to note that more space will be used for it, since upon the occasion of its former presentation it was utterly wasted upon many who attended the Show who did not have a chance to see it owing to crowded conditions.

Further, according to the committee, the great interest shown in the first exhibit of raw silk reeling has led to plans for the repetition of this also. D. E. Douty, special commissioner for the organizations promoting the Show, is now in the Orient, where he hopes to secure additional representative firms in China and Japan to exhibit, so that more varieties of reeling may be demonstrated. There will be extensive displays of Chinese and Japanese woven fabrics, Chinese silks of unusual historic interest, and specimens of the famous Japanese Obi silk In order to impress the full magnitude and splendor of the exhibit upon those with whom he will have to deal, Mr. Douty has with him special films showing scenes from the first Exposition, delegations from China and Japan, and many views and slides in color—a piece of enterprise highly commendable and one which should go far toward bringing about the desired results.

European concerns have also been invited to exhibit, thus making the Exposition thoroughly international in character. It is expected that there will be displays of manufactured articles by French, Italian, Swiss and English manufacturers, and exhibits of reeling by Italian reelers, since space for extensive reeling exhibits has already been reserved by Italian firms.

Still more immediately important, and more in direct line with the present thought, is the fact that although no national or international Silk Week has been decreed by official organizations this year, many individual manufacturers and retail houses are advertising their "annual silk week" for 1922. This cannot but be a source of gratification to those who planned the Silk Week of 1921, since it is evident that the idea has appealed to the public and proved profitable to dealers. It now bids fair to become a permanent institution.

From all of which it may be seen that the Silk Show and Silk Week, together, constitute a very real and powerful force in trade circles, and that interest in them is both alive and widespread. And when you can discover a force of this kind, upon which much money and promotion work is being expended, it remains but to "hitch up" your own "story" to this force in order to reap benefits which could not be secured at several times the cost in any other way.

In the case of the dye and silk industries, the connection is both legitimate and easy to establish.

It would not be a bad plan for American dye manufacturers seriously to consider a little consumer advertising on their own account.

The insurmountable difficulty in the way of this has always been to enable the public, after the so-called "missionary work" has been done, to trace the colors in any fabric back to their source, since it is not, and

is scarcely likely to become, customary for cloth manufacturers to stamp anything about dyes, American or otherwise, on the selvedges.

But since much of the glory of the Silk Show is the legitimate property of American dye manufacturers, it would be throwing away an excellent opportunity not to acquaint the public with that fact. It is not the policy of those in charge of the Show to permit the featuring of American dyes in connection with their exhibits, and hence it will not be possible directly to inform the public attending the exhibit. But the two things can be "tied up" in the public mind effectively, and some of the benefits of Silk Week made to affect the dye manufacturers—without, happily, diverting any of them in the slightest degree from the silk people—by means of a little judicious publicity.

It is true that the dye manufacturers cannot "claim everything in sight"—nor need they. But to inform the public at large, through selected consumer mediums, that a generous share of the attractiveness of the displays at Grand Central Palace and in store windows throughout the country is due to their efforts, would be to make legitimate capital of the attention temporarily directed by these events towards the general subject of textiles and colors, and to undo much of the adverse propaganda which is still being circulated as part of the far from mythical "whispering campaign."

It would seem that the opportunity is too good a one to let slip, and at all events it is by no means too early to talk it over quietly.

Correspondence

DR. HERTY'S JERSEY CITY ADDRESS

[North Billerica, Mass.,
March 23, 1922]

To the Editor of The Reporter:

In your edition of March 13, Dr. Herty publishes a letter sent to him by F. G. Zinsser. I would not have found it worth while answering it if it had not been for a rather personal attack by Mr. Zinsser, Sr. As it stands, allow me to make some corrections.

I do not know Mr. Zinsser, Sr., personally. He was not present at the conversation which took place between Mr. Zinsser, Jr., F. X. Lehmann, Dr. Walch and myself, and therefore I do not quite understand his attitude in this matter; neither do many others.

I will omit for the moment a few slurs, for which Mr. Zinsser, Sr., may claim all the credit.

He says literally, "Dr. Ernster came up here unsolicited. He did not have any conversation with Mr. Lehmann before or after he was in the room with my son, and his statements were made voluntarily, and not as the result of any questions that were put to him." That is a big mistake. Mr. Lehmann invited Dr. Walch and myself to come up and see him in his office at Zinsser & Co. Furthermore, I had a few moments' talk with Mr. Lehmann before our conversation with Mr. Zinsser, Jr., and after our conversation, Dr. Walch, Mr. Lehmann and myself left together for New York City, and we had a full half hour's conversation before Mr. Lehmann left the train at Ludlow. As for the statements regarding the German business man, I have given sufficient explanation in my two former letters to The American Dyestuff Reporter. What would Mr. Zinsser have called all this in plain language, if I had made the few assertions just mentioned?

Mr. Zinsser's own words, "Like very many of his countrymen, he may have said these things to make himself important, and there may not be anything in all his various statements," would be easily refuted by a little geographical knowledge. I was a native and citizen of Luxemburg before I became a citizen of the United States. I neither belong by origin or descent to the nation which he probably has in mind. Maybe his own case will give sufficient explanation of this rather vague but cheap statement.

There is no question of veracity between Dr. Ernster, Mr. Zinsser, Jr., and his Sales Manager. Dr. Ernster had his statements substantiated by Dr. Walch, who was an uninterested listener. These points cannot be settled by personal attacks. Those who know the parties interested are able to form their own opinion. Those who don't are very little interested in the subject.

But I will tell Mr. Zinsser, Sr., a secret here. His son tried to turn the conversation, spiked with questions "put to me," into a nice piece of propaganda—through the medium of Dr. Herty—to all of which I would not have objected but for the fact that I did not want to make false and malicious statements about anybody, not even Germans.

It did not work the way they wanted, and that is the reason for all their excitement. As for his gentlemanly language, Mr. Zinsser, Sr., I suppose, will have to take all the responsibility.

Dr. Nicolas Ernster.

FABRIC MADE FROM COCOONS

A British inventor has patented a fabric construction in which silk worm cocoons are packed closely together and kept in place by sewing, gluing or other suitable means. After moistening, the cocoons are flattened and arranged in rows with the edges overlapping, each row being one or several plies thick, as desired. When arranged in this manner they are fixed in position by sewing, gluing or riveting. The product may be varnished and made waterproof. This construction is claimed to give a very light, warm and strong fabric.

Recent Patents

(*Continued from page 272.*)

tated, and means for clamping the cover fluid tight upon the container.

2. In an apparatus for treating yarns and the like with a liquid a container having an open top, a plurality of parallel yarn holders fixed within the container and extending toward the top, said yarn holders being constructed to permit circulation of liqiud laterally therefrom into the container and in the reverse direction; a cover hinged to said container, means whereby the cover may be clamped in closed position fluid tight, a follower plate carried by said cover adapted to compress the yarn on said holders when the cover is closed, means whereby said follower plate may be pressed into contact with the yarns on said holders, said means comprising a rod connected to the center of the follower plate and extending through said cover, and means for operating the rod from the exterior of said cover to apply pressure to the yarn.

Vertical Retort for Carbonizing Coal

(1,407,996; February 28, 1922)

WILLIAM TEMPLE GARDNER, Bruern, England (assignor to the Isbell-Porter Company, Newark, N. J.)

This relates to retorts and more especially to that type used for carbonizing coal and has for its primary object to allow for the escape of the products of distillation from over the whole surface of the top of the retort thereby insuring a more efficient and uniform withdrawal of said products of distillation than heretofore accomplished in this class of retorts

The cross section in plan of a vertical retort is generally oblong and the off-take of volatile products from the mouthpiece of the retort is usually at one end of this oblong. When the major axis of the retort is increased in order to obtain a larger unit the volatile products given off on the side of the retort away from the outlet have to pass across the retort before they reach the outlet.

A more uniform withdrawal of products is secured by this invention, consisting in a construction which allows of escape from over the whole surface of the top of the retort.

Heretofore the mouthpiece has been practically a continuation of the charging hopper and has become filled with coal so that there has been no passage for gas except at that end of the mouthpiece at which the off-take is situated.

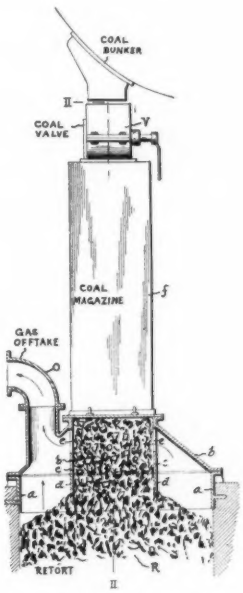
By this invention the chamber within the mouthpiece is subdivided by partitions which confine the coal as it leaves the hopper and until it has descended through the mouthpiece, so that there is a free space at each end of the mouthpiece; each partition has an opening at its upper part permitting passage of gas across the coal in the mouthpiece.

The invention consists of structural characteristics and relative arrangements of elements which will be hereinafter more fully described and particularly pointed out in the appended claims.

The drawing shows a longitudinal vertical section.

In the drawing *a*. is the casting constituting the top of the retort and *b* is the casting constituting the mouthpiece. The latter has transverse partitions *c* and these are extended by like partitions *d* in the casting *a*.

Each partition *c* has an opening *e* the shape of which is determined by the angle of repose of the coal on the



inclined bottom of the hopper *f*, the object being to permit the maximum opening while preventing flow of coal through the opening. Thus the coal does not spread laterally into the retort until it has arrived at the lower edge of the partitions *d* and the products can travel up over the whole top surface of the retort. The arrows indicate the flow of products.

Claims are granted as follows:

1. A feeding device for a vertical retort comprising a top section for the retort, a hopper, a mouthpiece having an inclined side and an outlet and interposed between and communicating with said top section and hopper, separated partitions within said mouthpiece and forming a passageway through the mouthpiece from the hopper into the top section, each of said partitions having an opening adjacent to the side of the mouthpiece opposite to its inclined side.

2. A feeding device for a vertical retort comprising a top section for the retort, a hopper having an inclined bottom, a mouthpiece having an outlet and an inclined side forming a continuation of the inclined bottom of said hopper and interposed between and communicating with

said top section and hopper, separated partitions within said mouthpiece and extending into the top section of the retort and forming a passageway through the mouthpiece from the hopper into the top section, each of said partitions having an opening adjacent to the side of the mouthpiece opposite to its inclined side.

THE PIECE DYEING OF LADIES' DRESS GOODS AND COATINGS WITH ACID COLORS

(*Continued from page* 256.)

out steam, then raise to a boil in one hour and a quarter, adding the bisulphate gradually. From this point on the process is identical with that of a tricotine.

In regard to poplins, great care must be taken during the rinsing. The kettle should be kept filled to the brim until the pieces are cold. Should the water get too low and the pieces happen to be still too warm, the result is mill wrinkles.

One method of dyeing cheaper grades of worsteds which has met with success is as follows: The goods are raised to a boil in one hour and dyed at that temperature for one hour and a half, except for light shades, and then sampled. The pieces are then removed from the kettles while hot and sent to an opener, which spreads the pieces to full width. In the meantime the kettlemen have made the required addition of color and two more pails of Glauber's salt. The pieces are then thrown back into the kettle, the ends sewed together, and the batch brought to the boil and boiled for one-half an hour. At the end of this time a fresh sample is taken, and if the goods are up to shade the boiling is continued for another half-hour, after which the pieces are washed. This method was very effective in correcting any tendency for the formation of rolling selvedges.

The Dyeing of Ladies' Coatings

Velours and broadcloths, for best results, should be tacked face inside. In the case of broadcloths, however, the thread used should be worsted and not cotton, as the latter tends to tear out the selvedge. It is also well to neutralize with ammonia at 120 deg. Fahr. for one-half hour to be sure that the pieces are perfectly clean. Rinse until all ammonia has been washed out.

After adding salt, dyestuff and acid, raise gradually to the boil in one hour and a quarter and boil for one-half hour before sampling. Then treat as if a light-weight fabric. If there should be difficulty in obtaining level dyeings with this method, add but half the color at the start and dye according to the procedure for worsted crepes. With this type of fabric the shade should be kept somewhat lighter for two reasons: First, the shade goes considerably darker during finishing; second, the shade goes darker upon cooling down in the dye bath.

The dyeing of Bolivia cloth and cheviots is very similar to that of velours, except in the case of tacking. When this is done the pieces are sewed with the face outside. The use of sulphuric acid is not to be recommended, because of the fact that the color goes on the fiber too quickly. It is best to start with acetic acid and add sodium acid sulphate to aid in the exhaustion.

Homespuns, wide wales, eponges, zibelines are dyed much the same as dress goods. The kettle should be brought to the boil in one hour and boiled for half an hour before sampling.

The Dyeing of Cotton Warp-Worsted Filling Effects

As a rule the cotton is dyed in the warp form with sulphur colors for blues, blacks, greens, olives, browns, etc. Red shades are secured by dyeing with primuline and then diazotizing and developing with sodium nitrite and beta-naphthol in the usual manner. Clarets and violets may be produced by dyeing with combinations of primuline and Diazine Black H, with subsequent treatment with nitrite and a developer. In some cases the warp is dyed Aniline Black after it has been woven into the fabric with the worsted filling. Naturally a very fast black is secured.

Usually such fabrics are crabbed in the grease and then sent to the washhouse before being dyed. After the goods are in the kettle, salt, color and acid are added, as was the case with all-worsted piece goods. It is best to use a combination of acetic acid and niter cake even with this type. Bring to a boil in one hour and continue boiling for thirty minutes before sampling. Care should be taken not to boil too long, as at times, depending a great deal on the colors used and method of application, the warp dye tends to bleed. Great care should be taken also to wash out every trace of sulphuric acid during the rinsing, or else a tendering action is apt to set in on the cellulose during drying and subsequent operations.

In case this bleeding alters the shade of the cotton appreciably, it may be corrected by a cold dyeing process. However, this can be done only with full shades. Colors must be used which dye cotton in a cold bath and which do not stain wool. Glauber's salt is used to aid in the exhaustion, together with a small amount of soda ash (say 4 ounces to 200 pounds of material). Use as short a bath as will allow the goods to run over the winch without slipping. Patch every twenty minutes and make additions until up to shade. Rinse with cold water, stopping the machine while water is being added. Then shut off the water, start the machine and pull the plug. When the kettle is empty of water stop the machine and repeat the procedure two or three times. Then add 3 to 4 pounds acetic acid (60 per cent) to the last wash-water and allow the pieces to run ten minutes. Rinse once and remove.

Colors suitable for cold dyeing are: Diamine Fast Yellow AB, Diazine Black H Extra, Erie Brown 3RB, Erie Red 4B, Erie Violet 3R, Newport Direct Yellow G and Erie Green NT.

Shading

In shading, the dyer must be especially watchful. In the first place, only the most level dyeing colors should be used, of which the following are good examples: Azo Wool Violet, Patent Blue V and A, Alizarine Sapphirol B, Amido Naphthol Red G, Fast Crimson GR, Fast Light Yellow 3G, Wool Orange GG crystals, Acid Green L and Wool Green S (for navy shades).

The color should be well diluted and well sieved before being added to the kettle. Needless to say, the steam should be turned off. Never under any conditions allow the kettlemen to be careless about this work, and caution them particularly about the danger of allowing the concentrated liquor to strike the pieces. After the color has been added, allow the pieces to run five to ten minutes without steam, depending upon how large a color addition has been made. After that the bath may be raised to a boil. At this point it might be well to remember that single pieces require more color to bring them to the required standard in proportion to their weight than do eight-piece lots, for example.

Stripping

All dyers have been brought face to face with the problem of how to treat pieces that are too full or too badly off shade to be corrected by ordinary methods. Generally each problem calls for good judgment. Everything, of course, depends on how badly off shade the batch is. If only slightly full, a further addition of Glauber's salt will often bring about the desired results. If any uncarbonized pieces which are to be dyed black are on hand, several of these may be thrown in the kettle and the boiling continued. The excess of color gradually strips from the full pieces and dyes the roughs, as they are called. This method is very satisfactory for the most part. When the batch has been stripped sufficiently, the roughs may be removed and dyed black without any trouble.

Another method of stripping acid colors is to let out half of the dye bath and then add cold water, together with 20 per cent more Glauber's salts and 1 to 2 per cent of sulphuric acid, depending on the depth of the shade. Raise to a boil and continue boiling for one-half hour before sampling. Often this will bring the shade down a considerable amount; far enough, in fact, so that, with the addition of the proper dyestuffs, the batch may be dyed to standard. Sometimes the entire dye bath is let out of the kettle, fresh water, salt and acid added, and the goods treated as above. If still too full it may be necessary to dye the pieces into a darker and entirely different shade.

Occasionally, however, the batch is so badly off shade that even the methods given fail in their purpose. In that case the dyer naturally thinks of ammonia. However, much depends on the type of the fabric. If the pieces happen to be fine quality worsteds which are to have a close finish, such as tricotines or Poiret twills, it is often poor judgment to use ammonia, due to the danger of the fibers felting. However, for serges, velours, broadcloths, Bolivias, etc., ammonia may be used without injuring the wool fiber appreciably. Even then it is well to remember that one more step has been added to the sequence of operations and that the wool is hurt accordingly. In no case should the stripping bath go above 120 deg. Fahr. At the end of thirty minutes, patch and wash off. Sometimes the pieces are not washed but acetic acid and Glauber's salt are added to the bath. The bath is then raised to the boil and dyed as before. The chemistry of this is quite simple. It is just another case of double decomposition, the acetic acid reacting with the ammonia in the stripping bath to produce water and ammonium acetate.

$$CH_3COOH + NH_4OH = CH_3COO.NH_4 + H_2O$$

The ammonium acetate as the temperature is raised to the boiling point reacts much the same as sodium acid sulphate under similar treatment. Acetic acid is formed, the ammonia passing off in the gaseous state.

$$CH_3COO.NH_4 = CH_3COOH + NH_3$$

Some dyers add niter cake or even sulphuric acid toward the end of the operation to aid in the exhaustion of the bath. This method naturally saves a large amount of dyestuff, although some color additions will probably have to be made in any event.

Repairs and Redyes

As will always be true, piece goods, for some reason or other, come to the rough perch only to be sent back to the dyehouse because of clouds or streaks. There are so many different reasons why these results may take place, not only in the dyeing process itself but also in operations preliminary and subsequent to the dyeing, that at times the management is often at a loss as to how to determine the exact cause. When such results occur, the cause should, if possible, be determined and corrected against future repetition. This calls for the closest sort of co-operation between the finisher and the dyer, with the superintendent as a third party.

In any case, however, the dyer must determine the future treatment of the damaged pieces. If not too badly streaked, etc., the goods may often be repaired to the same shade. When this is done they are dyed again, the method depending entirely upon the quality of the fabric. During the dyeing, however, a certain amount of color is stripped from the fabric, and to counteract this the dyer, to save time, often adds a proportion of colors to offset this. But at times it is a very difficult thing to determine this stripping effect, especially with mode shades, and consequently one generally may be assured that further color additions will be made later to bring the batch up to standard.

If the pieces which are rejected happen to be dyed a light shade they may often be dyed into a fuller shade, and thus cover up the unevenness. Uneven pieces also may be stripped with ammonia and then redyed; but, as stated before, the fabric itself must be considered.

Where it is impossible to correct cloudiness, etc., pieces may be redyed to a black. The redyeing to black is quite simple, although at times a correction must be made for the previous shade. Reds, for example, must be dyed with a suitable amount of green as well as black. In browns, the yellow must be offset with violet. Generally the bath is brought to a boil in one hour, boiled one hour and a quarter, and then washed off.

[THE END.]

THE MICROSCOPE: AN IMPORTANT INDUSTRIAL INSTRUMENT IN ANALYSIS, TESTING AND MANUFACTURE

(*Continued from page* 258.)

(b) *Thickness of Cover Glass, and Tube Length*

These are conditions which are not especially noticeable to ordinary microscope users but should be adhered to for securing very best results of corrections in objectives. A normal thickness of 0.18 mm. for cover glass is recommended by the makers. This is known technically as No. 2 thickness. With highest

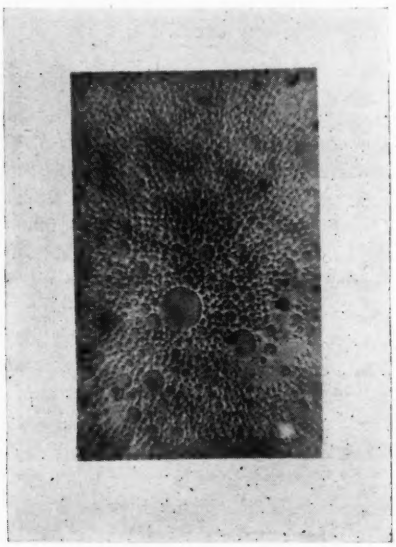


FIG. XII—*Micrograph of a commercial medicine containing emulsified oil, x* 675. *Taken with a* 1/12-*in oil immersion objective*

Observe the effect upon the eye of the edge portions which are not in clear focus

powers too thick a cover glass prevents a near enough approach of the objective to the object to give any image at all. In conjunction with cover glass thickness the tube length, or distance between objective and ocular, is important. A standard distance of 160 mm. is advocated as best for visual use.

(c) *Influence of Mounting Medium*

The proper choice of material in which to mount the object to be examined is highly important. As a general rule this mounting medium should be perfectly transparent and colorless. It should possess a sufficiently different refractive power on the light as compared to that of the object to give a clear image. Likewise, it should be physically and chemically inert upon glass and object. This is not true, of course, of reagent materials but only of a simple mounting medium. Unless there is a proper difference in refraction the image will be too indistinct to be of service. Physical change of compression or swelling, or chemical action will change the shape and size and not render a true idea of their normal condition. If this unchanged condition is important, then special care must be given to the choice of the mounting medium. Air is used as a mounting medium only with low powers and relatively large objects. With the higher powers, the edges of objects so mounted appear as broad dark spaces and not narrow, sharply defined lines. Color effects are also particularly noticeable. Water, salt solutions, diluted glycerine and oils are often used with objects which are not soluble in these reagents. Solid media like gelatine and Canada balsam, a tree resin, are much used as solid media for mounting. The important effect of the medium is easily shown by trying to examine finely pulverized corn starch when mounted first in air, then in water, and, finally, in 1 per cent gelatine, or in Canada balsam. With air the images of the grains are very unsatisfactory. In Canada balsam they are hard to see, but in water they show very nicely.

(d) *Preliminary Treatment of Object and Care in Preparation of Mount*

While in some cases the object needs little or no preparation in fitting it for examination, there are many times when much quicker and more accurate results can be obtained with special treatment of objects. The need for treatment and the kind of treatment vary with the type and condition of material being observed and with the purpose of the examination. Commercial starches many times require pulverizing in a mortar to produce the fine powder in which the individual starch granules are more easily seen.

Cloth is examined with low power and usually needs no treatment. It is simply slipped onto the stage and secured in a flat condition. Yarns and fibers often contain grease and oil. Fibers cannot be studied at very high magnification when mounted in air but, when immersed in a drop of water, very satisfactory images can be obtained. If the fiber contains oil it will not mix with the water and poor results will

be shown in the mount. A preliminary treatment to remove the grease will leave the fibers in a clean condition and easily mounted in water (see Fig. XIII). Light colored yarns containing animal and vegetable fibers, whether carded together, combed or twisted from separate strands, can be examined by immersing in water and noting the characteristics of each kind of fiber, but the process is long and uncertain. If, however, a section of the yarn is warmed with Millon's reagent, on a slide, and covered with a cover glass, then the animal fibers will stand out very prominently as brick red colored fibers and the vegetable fibers will be left uncolored. After this treatment it can be easily seen whether the yarn is carded or twisted, and if carded, the section may be spread out evenly over the slide and the animal and vegetable fibers counted, measured and identified very readily. In this case the difference in color brought about by the preliminary treatment makes subsequent study more rapid and certain.[1]

At times only a particular ingredient of the whole material is desired to be located and identified. With such cases the desired component may be concentrated by using differences in physical or chemical properties. A medical example which illustrates this point very nicely is found in making "blood counts." The number of white corpuscles in a given volume of blood is what is wanted. To detect and count the white corpuscles in the presence of the red cells is a very difficult task. But by treating the blood with acetic acid the red cells are dissolved and removed, leaving the white corpuscles intensified in their microscopical appearance. These corpuscles are then very easily seen and counted.

With the treated object ready for mounting, the observance of care in making the mount often repays for the slight effort expended. The use of a minute quantity helps a great deal. This is thinly spread out ,or uniformly distributed over the area of slide to be examined. Thus a drop of thick water suspension of corn starch may yield a field of starch grains so thick as to render no individual grains distinctly visible. The same drop, mounted after much dilution with water and spread out over a large area, will produce a single layer of separated grains, which are well defined in the image. Sealing the cover glass to the slide with a ring of oil reduces the evaporation of the water and, as a result, prevents undesirable movement of the grains.

It is hard to get used to employing micro quantities and to seeing that these are well distributed over the slides, but it pays to do so.

(e) *Illumination*

The character of illumination used has a very marked effect upon the results obtained. Conditions to be observed in particular are (1) steadiness, (2) brilliancy or intensity, and (3) color value. A flickering or unsteady source of light is excessively tiresome and hard to use. It is, however, easily prevented. The intensity of light employed affects the clearness of vision and the work put upon the eye. With too dim a light, the detail is hard to see and with an excessive amount of light no image at all may be seen, especially if the object is rather transparent. The disturbing effects upon the eye are noticeable at once.

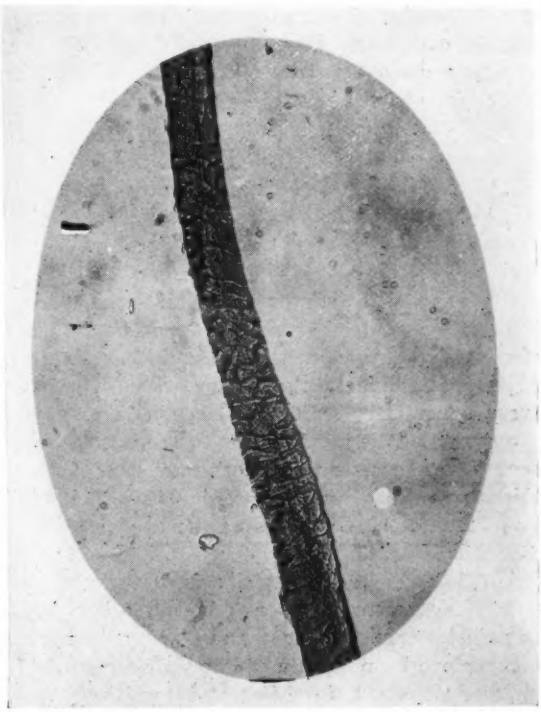


FIG. XIII—*Micrograph of wool, x 250, showing effects of unclean fiber and of dirty glass surfaces. The material on the fiber helps to obscure the edge The dirt on glass surfaces show here mainly in the background. Both of these conditions are easily avoided by preliminary cleaning*

When the right intensity is used, the eye feels no discomfort or strain and is able to see clearly defined all parts of the object which are in focus. The intensity is varied by changing the position of the mirror, by moving the light source nearer or further away from the mirror, by raising or lowering the condenser, by opening or closing the diaphragm beneath the stage, etc.

Varying color value of the light changes the ability of the objective to render fine detail distinctly visible. It also has a markedly confusing effect upon the observer. A person used to studying with the aid of daylight reflected from a northern blue sky from a white cloud, or from a white wall, has great difficulty

[1] Millon's reagent is easily prepared by dissolving mercury in its own weight of concentrated nitric acid and then diluting with an equal volume of water

in identifying the same object when the microscope is illuminated from a bare, carbon filament electric bulb, or by an oil lamp. This change of color value in artificial sources of light from that in reflected daylight, is one of the chief difficulties encountered with artificial illuminants. They are often too rich in yellow and too deficient in blue light. This defect is partially made up through the use of blue glasses or "daylight glass." In Figure XI are shown a few of the types of artificial sources of light, and the blue glasses used to correct their color values. Oil lamps are used with the narrow edge of the wick toward the mirror. Gas mantles, acetylene flames, and "daylight" electric lamps have proved fairly successful as artificial sources of light for visual use.

(f) *Care of the Eyes*

There is little if any danger to the eyes and no noticeable strain even with hours of work when a little attention is paid to the use of the eyes, to the regulation of the intensity of light, and to the sharpness of focus. A common cause for strain when using the compound microscope is found in the attempt to keep only one eye open. The squinting of the other eye is very tiresome to the face muscles. It represents a very unnecessary waste of strength, because with a little practice it is much easier to see with both eyes open. Therefore, keeping both eyes open is a wise habit to acquire. Furthermore, if the work is divided by an alternate use of eyes at the eye piece, a good practice is followed.

The observer ordinarily sits facing the source of light. This means that much light reaches the eyes from outside the instrument, and places a double strain upon the eye by presenting light simultaneously from two directions and of different intensities. A judicious use of an eye shade may be made which shields the eyes from this troublesome outside light.

There are times when it seems impossible to get a sharply defined image by focussing. This may be due to unclean optical surfaces, or to an object which is not lying flat enough. It is a natural tendency at such times to endeavor to make up for the lack of sharpness by straining the eye (see Fig. XII) This is unwise and unsuccessful. The eye can never compensate for trouble caused by smears. It is necessary to remove the smear. When the object has portions at different heights each successive portion may be brought into focus by using the focussing apparatus. All focussing should be done with the instrument and not with the eye. If it cannot be so done something is wrong with the instrument or with the object.

(g) *Posture*

A comfortable position while using the microscope is just as satisfying and just as important as when using any other instrument. It is well to provide an adjustable stool and a table of such relative heights that there is no crook produced in the back in trying to squeeze the body down to a lower position, nor any strain felt in the neck in trying to reach up and peek over the top of the instrument. These heights should be such that when the microscope is placed near the edge of the table all it is necessary to do is to incline the head forward. This is especially true when both hands are to be used at the same time in operating the focussing apparatus and in moving the object. The elbows should be able to rest easily upon the table when the hands are not in use.

The actual operation of the microscope is thus seen to be a relatively simple matter, and is easily learned. Regard for a few of the more common causes of trouble—lack of cleanliness, selection of the wrong thickness of cover glass or of an unsuitable mounting medium, or an improper condition of the object—will produce encouraging results and increase the interest in the continued application of the microscope.

(*Part IV, conclusion, will follow in an early issue.*)

NEW BLEACHING PROCESS

A process of bleaching vegetable materials, recently patented, is claimed to shorten the ordinary operation, preserve the strength of the fiber and give a satisfactory shade. The inventor, in his description of the process, states that formerly alkaline carbonates, phosphates and silicates, as well as caustic alkalis, were used in the first step of the bleaching process, i. e., the step wherein the material was treated with alkaline solutions at a temperature not exceeding 200 deg. Fahr., in order to wet-out the material and remove part of the coloring matters. These alkalis were also used for making the peroxide bleach bath alkaline. In the new process, alkalis are substituted by suitable lime compounds, of which the most preferable is calcium hydroxide in solution. After having soaked the materials in milk of lime at a temperature from normal to not exceeding 200 deg. Fahr., depending upon the nature of the fiber, to wet out the coloring matter, they are entered in the bleaching bath which is prepared as follows: Ten gallons of 25 per cent vol. H_2O_2 (peroxide of hydrogen) solution are added to eighty gallons of water, previously heated in the mixing tank to a somewhat higher temperature than is required in the application of the bath to the material to be treated. The temperature may vary from normal to not exceeding 200 deg. Fahr. according to the nature of the material undergoing treatment. To the diluted solution thus obtained lime water is added until the bath is brought to the desired degree of alkalinity depending upon the material acted upon and the degree of bleaching desired. The cold additions to the hot water, i. e., the added H_2O_2 solution and the lime water, lower the temperature of the bath to a degree just suitable for its application.

Italian Dye Industry Faces Strike

Operatives Refuse Wage Reduction Agreed Upon—Manufacturers Welcome Shutdown as Opportunity to Dispose of Accumulated Stocks—Salted Colors Preferred in Some Cases to Concentrated Reparation Dyes—Much "Rubbish," However, Being Worked Off on Old-Time Dyers Lacking Expert Chemical Advice

By RAFFAELE SANSONE

Genoa, March 8.
Special to The Reporter.

THE scarcity in the electric current created by reduced water-power continued during the past five weeks, although conditions were somewhat improved on the railways, where electric-train service could be resumed in some cases.

The regain in the value of the Italian lira also continued, bringing the United States dollar from 21.50 lire to 18.50 lire, the English pound sterling from 91.30 lire to 82.50 lire, and the German mark from 0.10 lira to 0.06 lira, causing the quotations of all foreign products to fall in proportion to the damage of the national producers.

The news of an approaching settlement of the financial difficulties caused by the suspension of the payments of the Banca Italiana di Sconto brought with it a partial recovery in the industries that had been deprived for the time being of a portion, or all, of their capital.

A Strike in View

Following the example of the producers of pharmaceutical products, of the oil works, of the citric acid works, of the tartaric acid works, of the perfume works and of the soap works, the Italian coloring matter industries would not agree to continue with the same conditions and wages as arranged last November, and insisted on a further reduction in the wages of the operatives, hoping in this way to meet present difficulties the better. The workpeople will not, however, agree to this plan, and there is the danger of a general strike. This strike will afford a certain advantage to the producers of dyestuffs, who will have more time for disposing of their stocks and preparing for a stronger recovery later. For the workpeople the strike would come at a bad moment, owing to the cost of living being still very high, and likewise to the general prevalence of unemployment.

Colors on the Italian Market

The aniline color works suffered further through the strong competition of the colors imported by the Italian Government from Germany on account of war reparation in much larger measure than in 1920, resulting in the accumulation of very large stocks. Besides such colors, there are continually offers of dyes of all concentrations and qualities at prices generally below those of the domestic colors, and many of these find sale even with the large establishments when the chemist and manager of the dyehouse or print works can be satisfied with their qual-

TABLE I

	Feb. 7 to Mar. 7 (lire)	February 7 (dollars)	March 7 (dollars)
Naphthol Yellow	50,000— 70,000	2,325—3,255	2,702—3,783
Auramine	70,000— 80,000	3,255—3,720	3,783—4,324
Orange II	30,000— 35,000	1,395—1,628	1,621—1,891
Nigrosine, water soluble	30,000— 40,000	1,395—1,860	1,621—2,162
Nigrosine, soluble in spirits	35,000— 40,000	1,628—1,860	1,891—2,162
Sulphur Black	7,000— 10,000	325— 564	378— 540
Acid Black	35,000— 40,000	1,628—1,860	1,891—2,162
Direct Black	35,000— 40,000	1,628—1,860	1,891—2,162
Chrome Black	40,000— 45,000	1,860—2,093	2,162—2,432
Methylene Blue	80,000—100,000	3,720—4,651	4,324—5,405
Direct Blue	25,000— 30,000	1,162—1,395	1,351—1,621
Sulphur Blue	45,000— 50,000	2,093—2,325	2,432—2,702
Malachite Green	80,000—100,000	3,720—4,651	4,324—5.405
Acid Green	60,000— 70,000	2,790—3,255	3,243—3,783
Direct Green	50,000— 70,000	2,325—3,255	2,702—3,783
Bismarck Brown	40,000— 50,000	1,860—2,325	2,162—2,702
Magenta (Fuchsine) Crystals	70,000— 80,000	3,255—3,720	3,783—4,324
Eosine	60,000— 80,000	2,790—3,720	3,243—4,324
Ponceaux	35,000— 45,000	1,628—2,093	1,891—2,432
Methyl Violet	70,000— 80,000	3,255—3,820	3,783—4,324

ity, strength and price. A portion of such dyes are dilutions of the concentrated products with common salt or other cheap diluting agents or means, and the dyers often prefer them to the concentrated reparation colors. Others are, however, little more than mere rubbish, and can only be sold with difficulty; and the seller, who often has been taken in—especially when he has purchased these products as ordinary chemicals from other merchants—has often to wait very long until he can find a small dye works where he can sell his product to some old-fashioned dyer with no chemist to discover its great weakness; it being left to the purchaser to find this out later during dyeing operations on a large scale. Very many such batches of weak dyes found their way into the Italian market during and since the war, owing to the necessity of purchasing colors where they were to be had. Some of the Italian color works have suspended, for such reasons, the construccion of new plants, and often find it more convenient to give their attention to accessory products which offer an easier margin and less complicated manufacturing processes.

The Demand for Colors

During the past five weeks, which were favorable for the cotton industry, the demand was stronger for basic colors than for any others. Others in good demand were the sulphur blacks and the direct colors (reds, browns, greens, yellows, violets, etc.). Less in demand were the acid colors—through the prolongation of the crisis in the wool industry—the alizarine colors, paranitraniline or ice colors, etc. For indigo the demand was fair.

Prices of Coal-Tar Dyes

The quotations of war reparation dyes in Table I, per

TABLE II

	— February 7 —		——March 7——	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina	1,600	74	1,600	86
Chrome alum	3,000	139	3,000	162
Bichromate of potash	6,000	279	6,000	324
Ferrous sulphate	500	23	500	27
Copper sulphate	2,450	114	2,250	121
Tartar emetic	12,000	558	12,000	648
Aniline oil	10,000	465	10,000	540
White refined glycerine	9,600	446	9,600	518
Glucose, 45 deg. Be	3,900	181	3,900	210
Hydrogen peroxide	2,100	98	2,100	113
Tannic acid, 60 per cent	20,000	930	20,000	1,080
Tartaric acid crystals	10,750	500	10,750	581
Acetic acid, 30 per cent	2,500	116	3,000	162
Hydrochloric acid, 20-21 deg. Be	300	13	300	16
Formic acid	11,000	511	11,000	594
Lactic acid, 80 per cent	4,000	186	4,000	216
Alum	1,000	46	1,000	54
Ammonia, 22 deg. Be	1,550	72	1,550	83
Bisulphite of soda, 32 deg. Be	400	18	400	21
Chlorate of potash	3,500	162	3,300	178
Chloride of ammonia	5,000	232	5,000	270
Bleaching powder	900	41	900	48
Nitrite of soda	3,000	136	3,200	172
Yellow prussiate of potash	13,000	604	13,000	702
Yellow prussiate of soda	9,000	418	9,000	486
Caustic soda, 70/72	2,700	125	2,300	124
Silicate of soda, 140 deg. Tw	1,000	46	1,000	54
Sodium sulphide	3,250	151	2,500	135
Logwood extract	10,000	465	10,000	540
Yellow dextrine	3,900	181	3,800	205
White dextrine	4,000	186	3,850	208
Farina	3,400	158	3,200	172
Kordofan gum	4,900	227	4,900	264
Indigo, 25 per cent	23,400	1,089	23,400	1,264
Beta-naphthol	18,000	837	18,000	972
Industrial castor oil	5,000	232	5,000	270

ton in lire and dollars, show the great difference brought about by the lower United States exchange (lire 18.50) prevailing at the moment of writing, in comparison with the February prices.

Mordants, Assistants, Dyehouse Products

The prices of mordants, assistants and dyehouse products suffered little variation; there was a great paucity of caustic soda, and this product was continually offered at the most widely varying prices. In the different imported chemicals, the reduction caused through the lower exchange was noted. Some of the changes in lire and dollars per ton are indicated in Table II.

DYE PROBE WITNESSES BECOME MORE DEFINITE AS METZ, HOBBS, THOMPSON AND SCHAMBERG TESTIFY

Large Consumers Favor Licensing; "No Monopoly," Agrees Metz, but Declares Tariff Sufficient; "Miserably and Damnable Calumny," Says Schamberg of Alleged Charges

Important testimony which featured the Senate investigation of the dye industry in this country just before this issue went to press was that of Henry B. Thompson, president of the United States Finishing Company, which is a large consumer of dyestuffs. Mr. Thompson is also a member of the Advisory Committee of the Textile Aliance, and chairman of the Dyes Advisory Committee of the War Trade Board, and he testified that as a consumer of dyes he had never observed any evidence of a combination in the dye industry, but on the contrary had found that competition had brought prices steadily downward. He submitted to the investigators a list of seventeen dye manufacturers with whom he regularly did business on an entirely free competitive basis. His company, he stated, used seventeen or eighteen colors, and in the last fifteen months the average reduction in prices had been about 50 per cent. He also refuted the charge of Senator King that he or his concern had benefited in any way through his activities in connection with the War Trade body or the Textile Alliance.

Another extremely important witness was Franklin W. Hobbs, president of the big Arlington Mills, one of the largest dye users in the country, who approved the present licensing system and stated that it should be retained until such time as domestic manufacturers of dyestuffs are able to compete with foreign rivals.

"There are some," he said, "who believe that the dye industry could be protected by a tariff. Personally I do not think a tariff could be written that would do the business, but that is not the point. We know that the plan now in force is workable, and will absolutely protect the industry; so why take chances and make a change?"

A very full statement, including a history of the dye industry in this country, was presented during several sessions of the hearings by Herman A. Metz, former Congressman and well-known importer and manufacturer. His testimony was partly designed to refute some of the charges that he was acting as an agent for German interests in seeking to import, and was characteristically frank and to the point. He declared himself glad of an opportunity to clear the record. He stated, among other things, that excellence, not natural resources, gave the Germans the monopoly formerly enjoyed by them, and that in acting as intermediary he had accepted the bonds required by Germany only at the suggestion of our own State Department.

He succeeded in creating a diversion and brought forth laughter, in which Francis P. Garvan himself joined, by ironically referring to the latter as "the savior of the dye industry."

Direct testimony of Mr. Metz touched upon his political career, his activities as an importer and manufacturer during the war, and his litigation with the Alien Property Custodian. He also testified that he was an associate member of the Textile Alliance, and had subscribed $5,000 a year for three years to aid its campaign to clean up alleged graft involved in payments of bribes to purchasing agents of mills.

Taking up the subject of Salvarsan, Mr. Metz said that he was making this product before the war, and is one of the four manufacturers producing it now under license of the Federal Trade Commission. Four or five others have also been licensed by the Chemical Foundation, he said.

In answer to questions from Senator Shortridge, chairman, Mr. Metz said he was in no combination affecting the manufacture of Salvarsan.

Senator Shortridge inquired whether his product was as efficacious as the German Salvarsan. The witness said he was willing to "admit" it was.

Although the American product is as good as, even better than, the German product, Mr. Metz said, many

WANTED

Wanted—Competent dyestuff laboratory man, capable of taking full charge. State previous experience. Address Box 209, American Dyestuff Reporter, 4109 Woolworth Building, New York City.

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doctors and patients want the German product, because they think it better; and they should have it because of psychological reasons. They have been denied the right to import, he said, but agreed "that it is quite clear under the law that they should be."

"I have been criticised by Mr. Garvan for trying to bring it in, although it would cut my own profits," said Mr. Metz, in effect.

Senator Sterling inquired if the witness would apply the same reasoning to dyes as to drugs; that is, if a man wanted German dyes, to let him import them, although they were manufactured here.

"Yes; if he wanted them, let him have them—make him pay for them," replied the witness.

"Make him pay any duty?" asked Senator Shortridge.

"Yes—as high as you want to make it," said the witness.

"It might be suggested that he could go to Germany and get it," suggested Senator Shortridge.

"Then, I think you would lose some of your best dyers," said the witness, in substance; "I think it would work out that they would get the goods dyed in Germany."

Mr. Metz thought the proposal—which at that time had been made—to protect the industry by means of 50 per cent ad valorem and 10 cents per pound specific, based on foreign valuation, adequate.

"Such rates will protect 75 per cent of the dye products," he stated. "I will guarantee to compete with any foreign manufacturer with those rates. The trouble with American manufacturers to-day is they are manufacturing with raw materials purchased when prices were several times what they are now. They are not willing to take their losses on these stocks." Twenty-five per cent of the consumption will be imported, he said.

One point brought out in which the committee seemed particularly interested was included in Mr. Metz's testimony regarding the Dermatological Research Laboratories, of Philadelphia, a concern organized as a non-profit organization for the purpose of manufacturing Salvarsan.

Competition, Mr. Metz said, to which he was subjected because of the activities of this concern, would be manifestly unfair, because while he was forced to pay heavy excess profits taxes, the Philadelphia organization, because of the manner in which it was organized, was not subjected to Federal taxes.

"This organization," he continued, "which has been referred to so many times by Mr. Garvan, because of their altruistic motives, have just voted themselves the profit of their organization to the amount of $500,000, under the guise that it is to be used for further research work."

"This concern, the Textile Alliance, and organizations in the dye and chemical industry organized as non-profit associations, are, in my mind, unfair competitors, because the manner in which they are organized allows them to escape many of the financial penalties to which manufacturers are subjected," Mr. Metz said.

Asked by Senator Sterling if he had complained to the Revenue Bureau, Mr. Metz replied that he had not, because whenever he made objections the old cry of "German agent" was brought against him, and he therefore thought it best to keep still, and let matters take their course.

Senator Shortridge questioned Mr. Metz concerning competition, and also the matter of a monopoly in the dye industry. Mr. Metz told the committee that there was strong competition, and, because of such competition, he did not believe there was a monopoly now; that if there was it could not be proven, and, finally, that he did not think it really existed, or could exist, with the industry in the condition it is now in.

He intimated, however, that if the opportunity developed under changed conditions, it might be possible for the big concerns to enter into agreements that would lean toward monopolistic conditions.

Chairman Shortridge also asked Mr. Metz the same question he put to all witnesses, namely, what, in his opinion, was necessary to protect the American dye industry?

Mr. Metz said it would be impossible to write a bill that would protect every color. He said, however, that 75 per cent of the industry could, without doubt, be protected by specific and ad valorem duties. A duty of 7 cents per pound and 50 per cent ad valorem on intermediates; and 7 cents per pound and 60 per cent ad valorem on coal tar finished products, the witness testified, would protect the industry, or at least that portion of it which was of consequence to the American manufacturer.

Salvarsan and other products, Metz argued should not be classified along with coal-tar products, but should bear a classification of their own. Mr. Metz, reading from his prepared statement, continued with his discussion of the Chemical Foundation, and the value of the patents taken over.

"Based on Mr. Garvan's statement, these patents do not seem to amount to much," Mr. Metz said, "but on the basis of 5 per cent on the Salvarsan patent, I paid, under Federal Trade Commission license, to the Alien Property Custodian in 1918, $11,000; in 1919, $35,000; in 1920, $51,000; in 1921 over $37,000. Assuming that during the four years I averaged one-half of the total sold, it would mean that the Salvarsan patents alone had paid to the Alien Property Custodian on 5 per cent of the selling price basis, between $265,000 and $270,000."

These points, Mr. Metz told the committee, were brought out by him to show that of the 4,700 patents sold by the Alien Property Custodian to the Chemical Foundation, some were of considerably more value than the $250,000 for which they were sold.

Mr. Metz also went into the organization of the Textile Alliance. He discussed at some length the matter of reparations dyes, and the work the Alliance was doing. Under a new protocol, he told the com-

mittee, prices were fixed which enabled the Alliance to sell on this side at practically the same figures he had to pay abroad, without duty.

"Eventually," he said, "conditions began to remedy themselves, and taking into consideration the small amount of goods that came here on a reparation basis, and at reparations prices, as compared with the totals that come in sold at the export prices, as compared with the totals that come in sold at the export prices to the Alliance, I, and other importers with better facilities for handling and distributing, can supply the consumers as cheaply, if not cheaper, than the Alliance.

"At the present day, of course," Mr. Metz said, in concluding, "with the awful slump that has come in the textile business, and the enormous amount of goods in the hands of dealers and manufacturers, there could be no effective combination. Everyone is trying to dispose of their stock on hand, and turn it into cash. It has ceased to be banking collateral—goods are being sacrificed, and quotations are made way below cost of production in many cases; and those making them, not realizing that by such quotations they are not increasing consumption, are simply demoralizing the market, and unloading wherever possible.

"I am sure that many plants were either entirely, or at least partly shut down during the past year or two —not because of foreign competition, but simply because they had no knowledge of the extent to which goods could be absorbed in this country, and the slump, which was bound to come, was not figured on.

"The situation, however, will clear up in time. Many of the smaller concerns have gone out of business, and others will continue to go during the coming year or the next.

"The large plants control the intermediates, which the little fellow has got to have. Unless he has a free field, and can import them when they are not obtainable here, it will be an easy matter to be out of stock just the time he wants goods. I have had such cases recently.

"My plants have been held up, waiting for raw materials, because an American manufacturer really had a monopoly, and could not produce sufficient of the product I had in mind, and, while he kept promising deliveries, it would take about six weeks to get them, and, naturally, the customers who wanted the dyes I was making, also had to wait.

"It was not until I applied to the War Trade Board for permission to import some from England, and they took up the question with the manufacturer, that I received a further shipment on account of my orders.

"I don't say that I was deliberately held up, but I do say that this was one instance in which it is shown what can, and will happen, under an embargo and licensing system. With the duty high enough to protect the industry—whether it be ad valorem or specific, and with freedom of importation when supplies are not available here, I have no doubt and no fear that the industry will continue to expand on much safer and broader lines than it possibly can under any artificial Government restrictions, which would leave it at the mercy of such infants in the industry as those who, in 1919 and 1920, issued those glowing prospectuses to the dear public, offering stocks and bonds for sale."

Dr. J. F. Schamberg, director of the research work of the Dermatological Research Association of Philadelphia, protested vigorously against the testimony relative to his institution given by Mr. Metz, which testimony was to the effect that the institute had presented itself with $500,000 of profits, made principally in the manufacture of Salvarsan.

Dr. Schamberg said he was at a loss to understand just what Mr. Metz meant by that statement. He said that if Mr. Metz meant that Dr. Schamberg and his associates turned over to an institute incorporated for philanthropic and scientific purposes money which they could legally have retained for themselves, Mr. Metz was correct; but that if he meant that one penny was retained for the personal profit of Dr. Schamberg or his associates, the statement was "a miserable and damnable calumny."

"I challenge Mr. Metz to explain just what he means," said Dr. Schamberg, who said he was constrained to believe that the statement was "a cowardly innuendo, calculated to excite distrust in the minds of the medical profession."

As to the complaint of Mr. Metz that he had to pay taxes on the profits derived from his manufacture of Salvarsan, while the Institute did not, Dr. Schamberg said the essential difference was that the Institute's profits went into further research work for scientific purposes of the benefit of the whole American public, whereas the profits of Mr. Metz went into his own pockets. The altruistic purposes of the Institute were "not comprehensible" to Mr. Metz, Dr. Schamberg said.

The Institute, Dr. Schamberg explained, is a non-profit institution, and the Internal Revenue Commissioner has ruled that it is not taxable under the income tax law.

At the close of Dr. Schamberg's testimony, A. C. Vandiver, of counsel for Mr. Metz, asked permission to cross-examine the witness, and it was finally agreed to have Dr. Schamberg return to Washington at a later date, at which time Mr. Vandiver said he would be prepared to cross-examine both Dr. Schamberg and Francis P. Garvan.

BUTTERWORTH-JUDSON CANCELS CONTRACT WITH STANDARD COLOR CO.; WILL MARKET OWN PRODUCTS

Butterworth-Judson Corporation, manufacturers of acids, intermediates and dyestuffs, has canceled its contract with L. M. Bowes under which Mr. Bowes, doing business as the Standard Color Company, was sole seller of Butterworth-Judson dye products. It is the intention of the Butterworth-Judson Corporation

to market all of its products through its own selling force.

Since April 8 the sales offices of Butterworth-Judson Corporation have been located at 30 Church Street, New York City. The expansion of their sales department necessitated this changing to larger quarters. An announcement of the company's new telephone numbers will be made in due time.

NATIONAL ISSUES NEW FUR FELT CARD, SPECIAL BULLETIN, AND NATIONAL WOOL NAVY B, A NEW NATIONAL COLOR

Recent activities of the National Aniline & Chemical Company in behalf of consumers include a new a color card under the title "Mode Shades on Fur Felt," a special bulletin devoted to National Superchrome Garnet Y and National Superchrome Red B, and the marketing of National Wool Navy B.

As part of the service which the company renders to the users of its dyes, systematic attention is paid to the frequent issue of color cards for the various industries in which color is used.

The latest example of this is a color card issued especially for the hat trade, entitled "Mode Shades on Fur Felt," which contains several new features of substantial interest and use to hat manufacturers. It is in the form of a folder, on the first page of which general dyeing directions are given and on which a sample piece of the material used in the subsequent dyed samples is shown. Then follow a series of forty-eight mode shades, and against each one is given the combination of dyes used, indicating the precentages required and the composition of the acid bath employed.

This special hat card will undoubtedly be well received by the fur felt dyeing trade and will be sent promptly from the branch offices of the company upon request.

National Superchrome Garnet Y and National Superchrome Red B are specially recommended for all classes of woolen or worsted goods where fastness to light, washing, fulling, potting or carbonizing is demanded. They are very level-dyeing and penetrate easily, and are fully described, together with methods for applying them. in the company's special bulletin. This contains sample dyeings by the afterchrome method, and also paper samples of Superchrome Red B Lake.

National Wool Navy B is a new Acid Blue especially recommended for the production of bright navy blues on ladies' dress goods with white cotton or artificial silk effects, and on knitting yarns, as it satisfies the light and washing requirements of these classes of material. It also possesses the excellent leveling properties of pre-war Acid Blues of this type.

Samples, together with dyeings accompanied by full working details, will be supplied by the company's nearest branch office.

DU PONT ANNOUNCES PONTACHROME RED B, PONTACHROME BROWN RH CONC. AND PONTAMINE FAST SCARLET 8BS

Three important new products recently placed upon the market, according to the announcement of the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., are Pontachrome Red B, Pontachrome Brown RH Conc. and Pontamine Fast Scarlet 8BS.

The general good fastness properties of Pontachrome Red B make it suitable for all varieties of high-grade woolen goods. This product leaves silk effects unstained, and therefore is an important addition to the company's silk white chrome colors for use in men's wear.

Pontachrome Brown RH Conc. is a valuable addition to the company's line of chrome colors, and is particularly noted for its level dyeing properties, like the similar pre-war dyestuff. It is very soluble, exhausts evenly and uniformly, and is therefore suitable for machine dyeing. It is particularly suitable for dyeing by the after-chrome method, although it also dyes well on chrome mordant. Cotton and artificial silk effects are not stained. It may be used also for vigoureux printing.

Pontamine Fast Scarlet 8BS adds to the company's line of direct cotton colors a product which is widely used and preferred because of its brilliancy and reasonably good fastness to acids, light and washing.

ATLANTIC ANNOUNCES ATLANTOLE WOOL BLUE S

The Atlantic Dyestuff Company announces the placing on the market of Atlantole Wool Blue S, on which they are in position to make regular deliveries of uniform quality.

This product is an acid color and has the property of dyeing easily, level and satisfactory shades, both as a self-color and in combination, and, for that reason, is especially suited for piece dyeing.

It is fast to light and washing and withstands the action of acids and alkalies, steaming and stoving.

By shading with small quantities of Azo Fuschine or Orange II, very desirable mode shades are obtained.

A. P. Villa & Bros., Inc., have incorporated for the purpose of dyeing and cleaning silk, cotton and other fabrics, with a capital of $2,000,000. The incorporators are: Alfonso P. Villa, Brookville, N. Y., Silvio Villa and Charles A. Lorenz.

The Charlotte Dye Works, Charlotte, N. C., has been chartered, with the principal incorporators being George H. Brockenbrough, Jr., George T. Brockenbrough, Sr., and G. L. Brockenbrough, with an authorized capital of $125,000. The plant will be maintained and operated in connection with that of the Belbro Mills, which the incorporators of the new firm own, to be run as an auxiliary supply source of dyes used by the mill.